United States
Department of
Agriculture

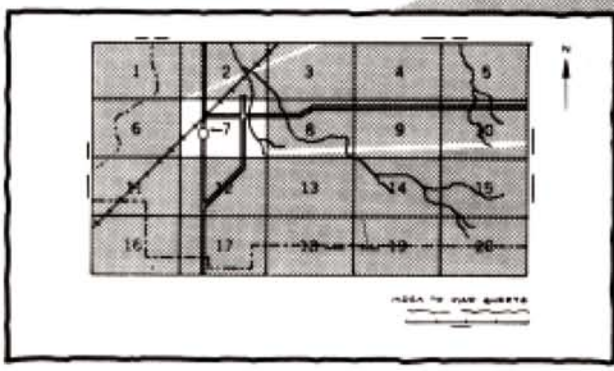
Soil
Conservation
Service

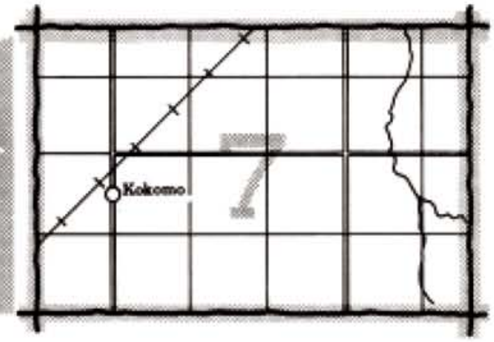
In cooperation with
Arkansas Agricultural
Experiment Station

Soil Survey of Columbia County, Arkansas

HOW TO USE

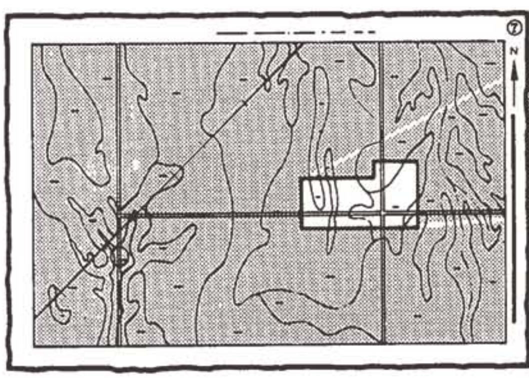
1. Locate your area of interest on the "Index to Map Sheets"

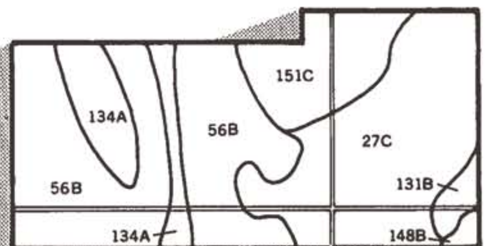




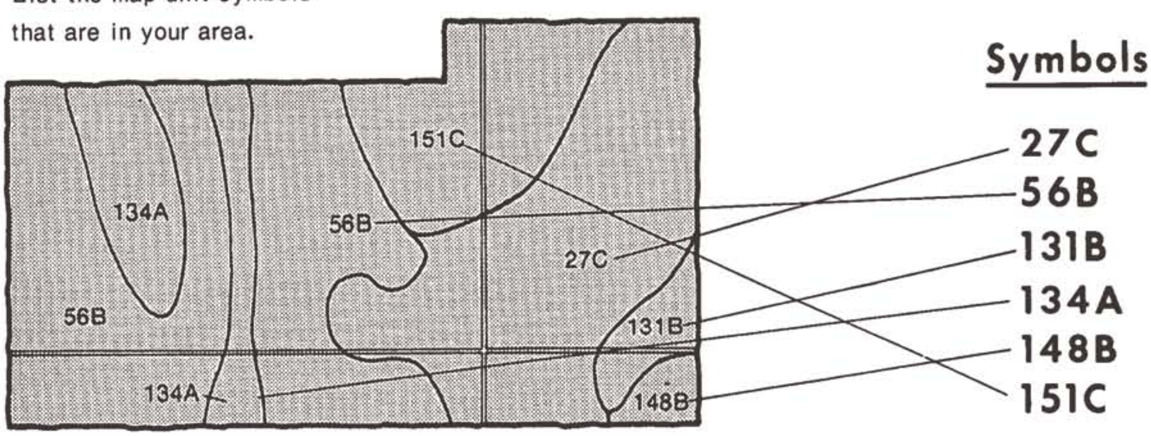
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



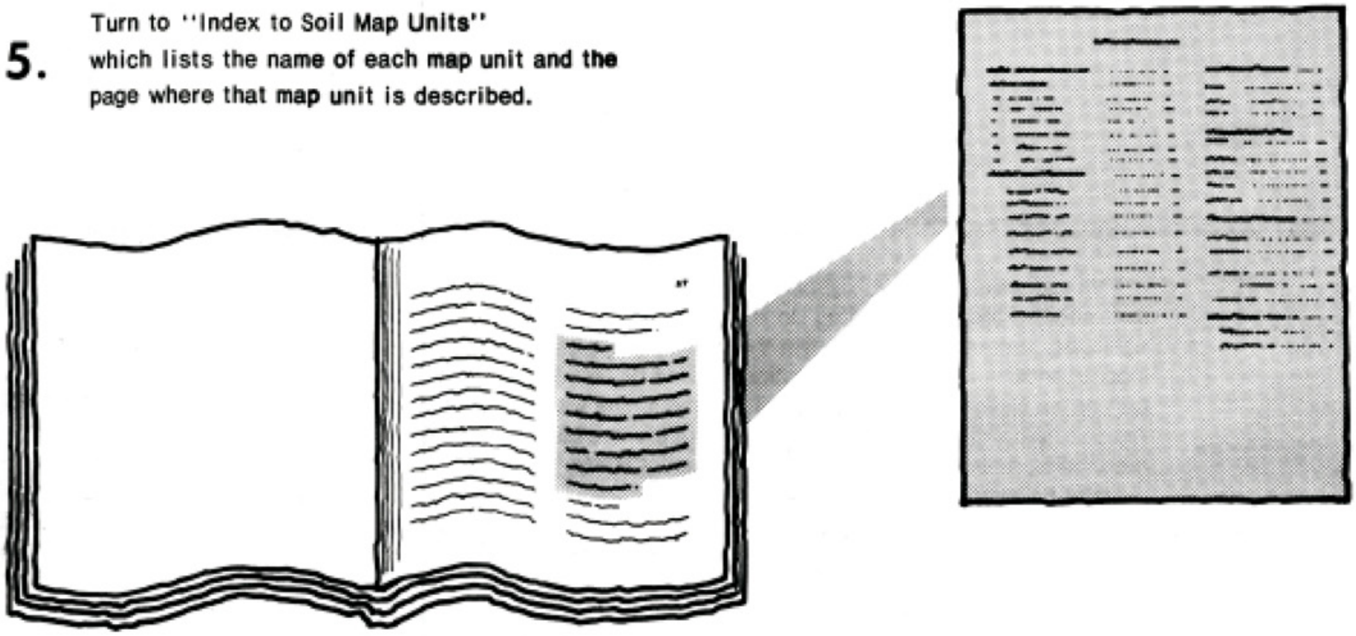


4. List the map unit symbols that are in your area.

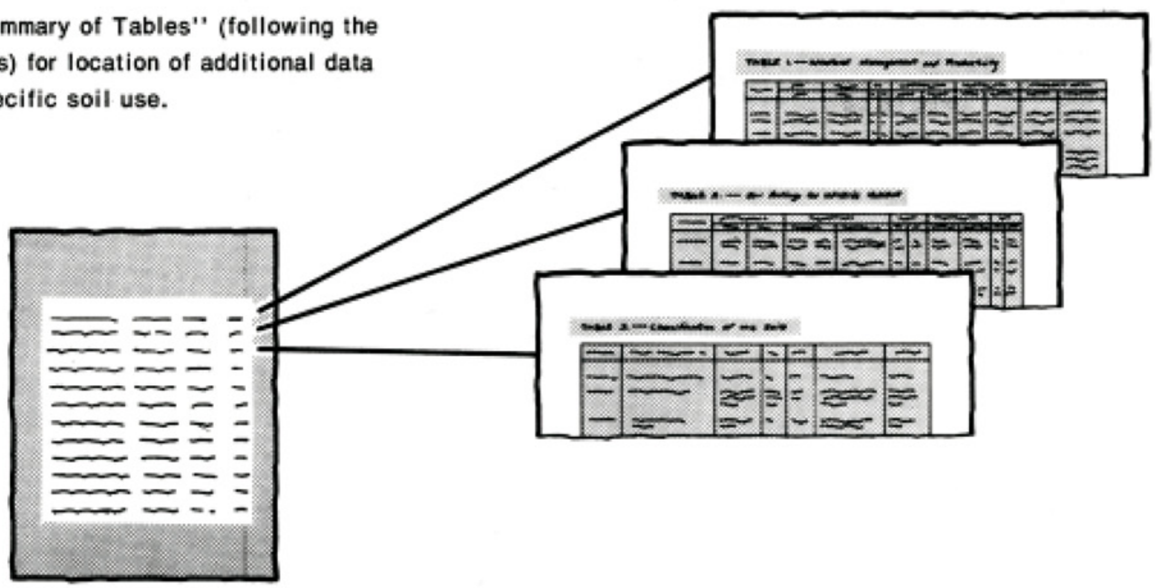


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This soil survey was made cooperatively by the Soil Conservation Service and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Columbia County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

An older survey of Columbia County was published in 1914. This survey is now out of print. The present survey updates the first survey and provides additional interpretative information, contains more detail, and has soil boundaries delineated on aerial photographs.

Cover: This stand of loblolly pine on Muskogee silt loam, 1 to 3 percent slopes, has been selectively thinned. This is one of the management practices necessary to get maximum wood production.

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Foreword

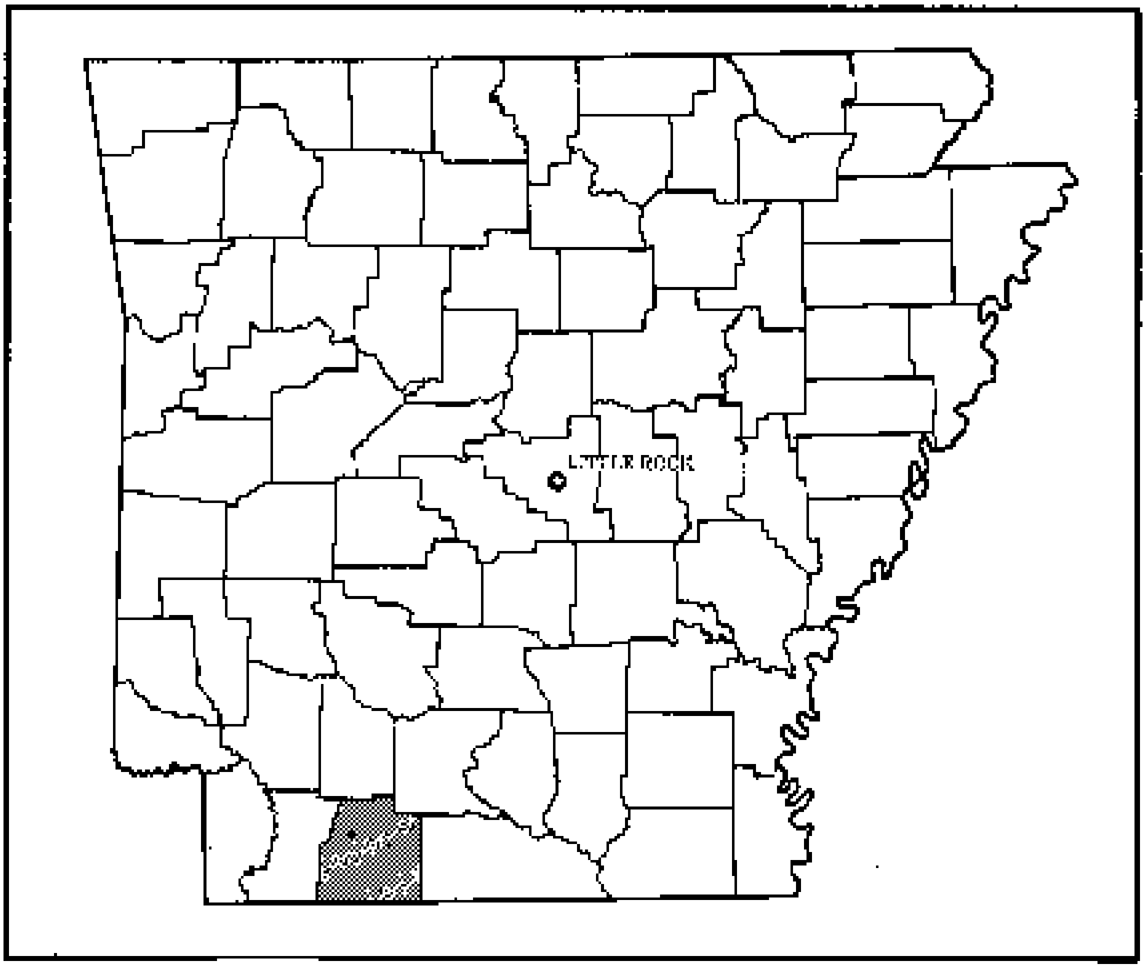
This soil survey contains information that can be used in land-planning programs in Columbia County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Jack C. Davis
State Conservationist
Soil Conservation Service



Location of Columbia County in Arkansas.

Soil Survey of Columbia County, Arkansas

By Chris Avery, Soil Conservation Service

Fieldwork by Chris Avery, Leodis Williams, Thomas W. Fortner, Charles L. Fultz, and Andrew J. Johnson, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with
Arkansas Agricultural Experiment Station

COLUMBIA COUNTY is in the southwestern part of Arkansas. The total area of the county is about 490,944 acres, or about 767 square miles. It is about 30 miles from north to south and about 29 miles from east to west.

Columbia County is bounded on the east by Union County, on the north by Ouachita and Nevada Counties, on the west by Lafayette County, and on the south by Webster and Claiborne Parishes, Louisiana.

In 1980, the population of the county was 26,664. Magnolia, with a population of 11,909, is the county seat. Other communities in decreasing order of population are Waldo (1085), McNeil (725), Taylor (657), and Emerson (444).

General Nature of the County

In this section, the physical and environmental factors that affect Columbia County are discussed. These factors include farming, physiography and drainage, and climate.

Farming

Columbia County was formed in 1852 from parts of Lafayette, Union, Ouachita, and Hempstead Counties. In 1853 Magnolia was named the county seat. One of the earliest settlements in the county was Calhoun *(4)*.

Early settlers came to Columbia County in the early 1800's. The majority of these settlers came from other southern states. All of the county was once covered by forest. Early settlers were subsistence farmers. Later settlers cleared the land, and cotton became the main agricultural export. According to the census of agriculture, 32,427 acres of cotton were reported in 1880 and 53,423 acres in 1910. In 1909, 15,686 bales of cotton were produced and in 1913 slightly over 23,000 bales.

Farming has changed to make the type of farm operations more compatible with the soil. Today the timber industry is an important part of the economy. A large acreage is managed for the production of pulpwood, poles, and saw logs (fig. 1). Most of the remaining land is used for pasture and forage crops. Very small acreages are used for watermelons, peach orchards, winter small grains, cotton, and soybeans. Livestock production and poultry production are also economically important in the county.

In 1981 about 17 percent of Columbia County was in farms. Between 1974 and 1981 the number of farms decreased from 537 to 487. During the same time the average size of the farm stayed at about 172 acres *(9)*. The rest of the county consists of extensive wooded tracts; cities and towns; transportation and utility facilities; other built-up areas, such as homes, industrial developments, and oil fields; and state land within Logoly State Park.

Nearly all of the farms are small enough that families can do the work with occasional outside help in peak seasons. Most farms have sufficient modern equipment to farm efficiently.

Physiography and Drainage

The geologic deposits at the surface in Columbia County are unconsolidated sediment laid down by water.

Figure 1.—A pine plantation on Bowie fine sandy loam, 1 to 3 percent slopes, being managed for the production of wood products.

Topographically, Columbia County can be divided into two main regions or land resource areas: the level to nearly level terrace positions west of Bayou Dorcheat and the level to moderately sloping Coastal Plain east of Bayou Dorcheat.

The topography of the terraces is mostly broad flats except for a few areas that are nearly level to gently sloping. The major soils on the broad flats are Adaton, Felker, Louin, and Wrightsville soils. The major soils on the nearly level to gently sloping areas are Blevins, Gore, Muskogee, Ruston, and Smithdale soils.

The topography of the Coastal Plain region ranges from upland flats to moderately sloping hills that have rounded crests and dendritic drainage patterns. Slopes range from 0 to 12 percent. The major soils in this area are Angie, Bowie, Briley, Harleston, Ruston, Sacul, Smithdale, and Warnock soils.

Drainage in Columbia County is mainly from north to south through a system of natural drainageways. The streams in the western part of the county are tributaries to the Red River, while those in the eastern part are tributaries to the Ouachita River. The divide separating these two drainage systems is marked roughly by a line from the northern county boundary passing southward to just east of McNeil, then southwestward to a point about 4 miles east of Magnolia, and then southward to the State line about 2 miles east of Highway 79.

Bayou Dorcheat, with its tributaries, carries the drainage in the western part of the county. Big Cornie Creek carries most of the drainage in the eastern part of the county. Smackover Creek carries most of the drainage in the northeastern part of the county.

The major tributary streams to the main drainageways are Crooked Creek, Beech Creek, Big Creek, Horsehead Creek, Cypress Creek, Little Cornie Creek, Pigeon Roost Creek, Hurricane Creek, Village Creek, Sloan Creek, and Birchfield Creek. These streams have numerous small tributaries throughout the county.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Columbia County has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short, with only a rare cold wave that moderates in 1 or 2 days. Precipitation is fairly heavy throughout the year, and prolonged droughts are rare. Summer precipitation, mainly afternoon thunderstorms, is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Magnolia in the period 1951 to 1980. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 46 degrees F, and the average daily minimum temperature is 35 degrees. The lowest temperature on record, which occurred at Magnolia on January 12, 1962, is -4 degrees. In summer the average temperature is 80 degrees, and the average daily maximum temperature is 92 degrees. The highest recorded temperature, which occurred at Magnolia on July 16, 1954, is 108 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 50 inches. Of this, 25 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 9.80 inches at Magnolia on June 8, 1974. Thunderstorms occur on about 55 days each year, and most occur in summer.

The average seasonal snowfall is 2 inches. The greatest snow depth at any one time during the period of record was 5 inches. On an average of 1 day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in spring.

Severe local storms, including tornadoes, strike occasionally in or near the area. They are short and cause variable and spotty damage. Every few years in summer or autumn, a tropical depression or remnant of a hurricane which has moved inland causes extremely heavy rains for 1 to 3 days.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary widely in their potential for major land uses.

Each map unit is rated for *cultivated crops, pasture crops, woodland,* and *urban uses*. Cultivated crops are those grown extensively in the county. Pasture crops are those grown for livestock forage production. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments.

1. Felker-Adaton

Somewhat poorly drained and poorly drained, level to nearly level, deep, loamy soils; on upland flats

This map unit is in the southwestern part of the county, west of Dorcheat Bayou. The soils formed in silty marine sediment.

This map unit makes up about 6 percent of the county. It is about 45 percent Felker soils, 28 percent Adaton soils, and 27 percent soils of minor extent.

Felker soils are on slightly higher positions and are somewhat poorly drained. The surface layer is brown silt loam. The subsoil is yellowish brown or brownish yellow, mottled silt loam; mottled gray, yellowish brown, and brownish yellow clay loam; and mottled red, gray, and yellowish brown silty clay loam.

Adaton soils are on slightly lower positions and are poorly drained. The surface layer is dark grayish brown silt loam. The subsoil is light brownish gray, mottled silt loam; light brownish gray, mottled silty clay loam; and grayish brown, mottled silty clay loam.

Of minor extent in this map unit are the well drained Blevins soils, the moderately well drained Gore and Muskogee soils, the somewhat poorly drained Louin soils, and the poorly drained Wrightsville soils.

Most areas of this map unit are in woodland. Small areas have been cleared; these areas are in pasture or are cultivated. Wetness is the main limitation of these soils for farming.

Felker soils are well suited to cultivated crops and pasture. Adaton soils are moderately suited to cultivated crops and pasture. These soils have high potential productivity for commercial production of wood crops.

Felker soils are moderately suited or poorly suited to most urban uses. Wetness and shrinking and swelling are moderate limitations for dwellings and small commercial buildings. Low strength, wetness, and shrinking and swelling are moderate limitations for local roads and streets. Wetness and slow permeability are severe limitations for septic tank absorption fields.

Adaton soils are poorly suited to most urban uses. Wetness is a severe limitation for dwellings, small commercial buildings, and local roads and streets. Slow permeability and wetness are severe limitations for septic tank absorption fields.

2. Wrightsville-Louin

Poorly drained and somewhat poorly drained, level, deep, loamy soils; on upland flats

This map unit is in the extreme southwestern part of the county, west of Dorcheat Bayou. The soils formed in clayey alluvium.

This map unit makes up about 1 percent of the county. It is about 60 percent Wrightsville soils, 30 percent Louin soils, and 10 percent soils of minor extent.

Wrightsville soils are poorly drained. The surface layer is grayish brown silty clay loam. The subsurface layer is light gray, mottled silty clay loam. The subsoil is silty clay. In sequence, it is gray and mottled, grayish brown and mottled, light brownish gray and mottled, light gray and mottled, and yellowish red and mottled.

Louin soils are somewhat poorly drained. The surface layer is dark grayish brown silty clay loam. In sequence, the subsoil is light brownish gray, mottled silty clay; gray, mottled clay; and light brownish gray, mottled clay.

Of minor extent in this map unit are the poorly drained Adaton soils and the somewhat poorly drained Felker soils.

Most areas of this map unit are in woodland. Small areas have been cleared; these areas are in pasture. Wetness is the main limitation of these soils for farming.

These soils are moderately suited to cultivated crops and pasture. They have moderately high potential productivity for commercial production of wood crops.

The soils in this map unit are poorly suited to most urban uses. Wetness and shrinking and swelling are severe limitations for dwellings and small commercial buildings. Low strength, wetness, and shrinking and swelling are severe limitations for local roads and streets. Wetness and very slow permeability are severe limitations for septic tank absorption fields.

3. Sacul-Smithdale

Moderately well drained and well drained, nearly level to moderately sloping, deep, loamy soils; on hilltops and side slopes

This map unit is adjacent to the eastern edge of Dorcheat Bayou, from the central part of the county to the Louisiana State line. The soils formed in clayey and loamy marine sediment.

This map unit makes up about 5 percent of the county. It is about 40 percent Sacul soils, 35 percent Smithdale soils, and 25 percent soils of minor extent.

Sacul soils are moderately well drained. The surface layer is dark brown fine sandy loam. The subsurface layer is dark yellowish brown fine sandy loam. In sequence, the subsoil is red clay; red mottled silty clay; mottled red, light brownish gray, and strong brown silty clay; and mottled light gray, red, and strong brown silty clay loam. The underlying material is light brownish gray mottled clay loam and light brownish gray sandy clay loam that has streaks and strata of strong brown sandy loam.

Smithdale soils are well drained. The surface layer is dark grayish brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. In sequence, the subsoil is red sandy clay loam; red, mottled sandy clay loam; and red sandy loam that has pockets and streaks of clean sand grains.

Of minor extent in this map unit are the moderately well drained Angie and Bowie soils and the well drained Briley and Ruston soils.

Most areas of this map unit are in woodland. Small areas have been cleared; these areas are in pasture. Slope and erosion are the main limitations of these soils for farming.

Sacul soils are moderately suited to unsuited to cultivated crops and are moderately suited or poorly suited to pasture. Smithdale soils are moderately suited to cultivated crops and are well suited to pasture. These soils have moderately high potential productivity for commercial production of wood crops.

Sacul soils are poorly suited to most urban uses. High shrink-swell potential is a severe limitation for dwellings and small commercial buildings. Low strength and shrinking and swelling are severe limitations for local roads and streets. Slow permeability and wetness are severe limitations for septic tank absorption fields.

Smithdale soils are well suited or moderately suited to most urban uses. Limitations are slight for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. Moderate permeability is a moderate limitation for septic tank absorption fields.

4. Bowie-Sacul

Moderately well drained, nearly level to moderately sloping, deep, loamy soils; on hilltops and side slopes

This map unit is in the northwestern, central, and south-central parts of the county. The soils formed in loamy and clayey marine sediment.

This map unit makes up about 31 percent of the county. It is about 45 percent Bowie soils, 20 percent Sacul soils, and 35 percent soils of minor extent.

Bowie soils have a dark brown, fine sandy loam surface layer. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish brown sandy clay loam and yellowish brown, mottled sandy clay loam.

Sacul soils have a dark brown, fine sandy loam surface layer. The subsurface layer is dark yellowish brown fine sandy loam. In sequence, the subsoil is red clay; red mottled silty clay; mottled red, light brownish gray, and strong brown silty clay; and mottled light gray, red, and strong brown silty clay loam. The underlying material is light brownish gray mottled clay loam and light brownish gray sandy clay loam that has streaks and strata of strong brown sandy loam.

Of minor extent in this map unit are the poorly drained Amy, Bibb, and Guyton soils; the moderately well drained Angie, Harleston, and Ora soils; and the well drained Briley, Ruston, and Smithdale soils.

Most areas of this map unit are in woodland. Small areas have been cleared; these areas are in pasture. Slope and erosion are the main limitations of these soils for farming.

Bowie soils are well suited or moderately suited to cultivated crops and are well suited to pasture. Sacul soils are moderately suited to unsuited to cultivated crops and are moderately suited or poorly suited to pasture. These soils have moderately high potential productivity for commercial production of wood crops.

Bowie soils are well suited to poorly suited to most urban uses. Limitations are slight for dwellings, small commercial buildings, and local roads and streets. Moderately slow permeability is a severe limitation for septic tank absorption fields.

Sacul soils are poorly suited to most urban uses. High shrink-swell potential is a severe limitation for dwellings and small commercial buildings. Low strength and high shrink-swell potential are severe limitations for local roads and streets. Slow permeability and wetness are severe limitations for septic tank absorption fields.

5. Guyton

Poorly drained, level, deep, loamy soils; on flood plains of local drains and major streams

This map unit is on flood plains throughout most of the county. This soil formed in silty alluvium.

This map unit makes up about 15 percent of the county. It is about 70 percent Guyton soils and 30 percent soils of minor extent.

Guyton soils are on level flood plains. The surface layer is grayish brown, mottled silt loam. The subsurface layer is light brownish gray, mottled silt loam. The subsoil is light brownish gray, mottled silt loam and gray, mottled silty clay loam. The underlying material is gray silt loam.

Of minor extent in this map unit are the poorly drained Adaton, Amy, Bibb, and Smithton soils; the somewhat poorly drained Felker soils; and the moderately well drained Harleston soils.

Most areas of this map unit are in woodland. A few acres have been cleared; these areas are in pasture. Wetness and the hazard of frequent flooding are the main limitations of this soil for farming.

Guyton soils are unsuited to cultivated crops and are poorly suited to pasture. This soil has high potential productivity for commercial production of wood crops.

This soil is poorly suited to most urban uses. The hazard of flooding and wetness are severe limitations for dwellings and small commercial buildings. Low strength, wetness, and the hazard of flooding are severe limitations for local roads and streets. The hazard of flooding, wetness, and slow permeability are severe limitations for septic tank absorption fields.

6. Smithdale

Well drained, gently sloping, deep, loamy soils; on uplands

This map unit is in the west-central and southwestern parts of the county. This soil formed in loamy marine sediment.

This map unit makes up about 3 percent of the county. It is about 75 percent Smithdale soils and 25 percent soils of minor extent.

Smithdale soils are on gently sloping uplands. The surface layer is dark grayish brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. In sequence, the subsoil is red sandy clay loam; red, mottled sandy clay loam; and red sandy loam that has pockets and streaks of clean sand grains.

Of minor extent in this map unit are the moderately well drained Bowie soils; the well drained Briley, Darco, and Ruston soils; and the excessively drained Darden soils.

Most areas of this map unit are in woodland. Small areas have been cleared; these areas are in pasture. The hazard of erosion is the main limitation of this soil for farming.

Smithdale soils are moderately suited to cultivated crops and are well suited to pasture. This soil has moderately high potential productivity for commercial production of wood crops.

This map unit has slight or moderate limitations for urban uses. Limitations are slight for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. Slow permeability is a moderate limitation for septic tank absorption fields.

7. Harleston-Bowie

Moderately well drained, nearly level to gently sloping, deep, loamy soils; on hilltops, side slopes, and low terraces

This map unit is in the south-central part of the county. The soils formed in loamy marine sediment.

This map unit makes up about 10 percent of the county. It is about 55 percent Harleston soils, 35 percent Bowie soils, and 10 percent soils of minor extent.

Harleston soils have a dark grayish brown, very fine sandy loam surface layer. The subsurface layer is pale brown very fine sandy loam. The subsoil is yellowish brown, mottled very fine sandy loam and gray, mottled loam.

Bowie soils have a dark brown, fine sandy loam surface layer. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish brown sandy clay loam and yellowish brown, mottled sandy clay loam.

Of minor extent in this map unit are the poorly drained Amy, Guyton, and Smithton soils and the moderately well drained Angie and Sacul soils.

Most areas of this map unit are in woodland. Small areas have been cleared; these areas are in pasture. The hazard of erosion is the main limitation of these soils for farming.

These soils are well suited or moderately suited to cultivated crops. Harleston soils are well suited or moderately suited to pasture, and Bowie soils are well suited to pasture. These soils have moderately high potential productivity for commercial production of wood crops.

Harleston soils are moderately suited to most urban uses. Wetness is a moderate limitation for dwellings and local roads and streets. Wetness and slope are moderate limitations for small commercial buildings. Wetness is a severe limitation for septic tank absorption fields.

Bowie soils are well suited to poorly suited to most urban uses. Limitations are slight for dwellings, small commercial buildings, and local roads and streets. Moderately slow permeability is a severe limitation for septic tank absorption fields.

8. Sacul-Angie-Warnock

Moderately well drained, nearly level to moderately sloping, deep, loamy soils; on hilltops and side slopes

This map unit is in the eastern third of the county. The soils formed in clayey and loamy marine sediment.

This map unit makes up about 29 percent of the county. It is about 35 percent Sacul soils, 15 percent Angie soils, 12 percent Warnock soils, and 38 percent soils of minor extent.

Sacul soils have a dark brown, fine sandy loam surface layer. The subsurface layer is dark yellowish brown fine sandy loam. In sequence, the subsoil is red clay; red mottled silty clay; mottled red, light brownish gray, and strong brown silty clay; and mottled light gray, red, and strong brown silty clay loam. The underlying material is light brownish gray mottled clay loam and light brownish gray sandy clay loam that has streaks and strata of strong brown sandy loam.

Angie soils have a brown, fine sandy loam surface layer. The subsurface layer is pale brown fine sandy loam. In sequence, the subsoil is strong brown silty clay loam; yellowish brown, mottled silty clay loam; yellowish brown, mottled silty clay; and light brownish gray, mottled clay.

Warnock soils have a dark brown, fine sandy loam surface layer. The subsurface layer is light yellowish brown fine sandy loam. In sequence, the subsoil is yellowish brown sandy clay loam; yellowish brown, mottled sandy clay loam; mottled red, light brownish gray, yellowish brown, and strong brown sandy clay loam; and gray, mottled sandy clay loam.

Of minor extent in this map unit are the poorly drained Amy, Bibb, and Guyton soils; the well drained Briley, Darco, Ruston, and Smithdale soils; the excessively drained Darden soils; and the moderately well drained Harleston soils.

Most areas of this map unit are in woodland. Small areas have been cleared; these areas are in pasture. Slope and the hazard of erosion are the main limitations of these soils for farming.

Sacul soils are moderately suited to unsuited to cultivated crops and are moderately suited or poorly suited to pasture. Angie and Warnock soils are well suited or moderately suited to cultivated crops and pasture. Sacul and Warnock soils have moderately high potential productivity for commercial production of wood crops. Angie soils have high potential productivity for commercial production of wood crops.

Sacul soils are poorly suited to most urban uses. High shrink-swell potential is a severe limitation for dwellings and small commercial buildings. Low strength and shrinking and swelling are severe limitations for local roads and streets. Slow permeability and wetness are severe limitations for septic tank absorption fields.

Angie soils are poorly suited to most urban uses. Shrinking and swelling is a severe limitation for dwellings and small commercial buildings. Low strength and shrinking and swelling are severe limitations for local roads and streets. Wetness and slow permeability are severe limitations for septic tank absorption fields.

Warnock soils are well suited or moderately suited to most urban uses. Limitations are slight for dwellings. Slope is a moderate limitation for small commercial buildings. Low strength is a moderate limitation for local roads and streets. Moderate permeability and wetness are moderate limitations for septic tank absorption fields.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Sacul fine sandy loam, 3 to 8 percent slopes, is one of several phases in the Sacul series.

Some map units are made up of two or more major soils. These map units are called soil complexes or soil associations.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Darden-Darco loamy fine sands, 2 to 8 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Adaton-Felker association, 0 to 2 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Oil-waste land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

1—Adaton-Felker association, 0 to 2 percent slopes. This association consists of deep, poorly drained and somewhat poorly drained, level to nearly level soils on broad upland flats. The individual soils are in areas large enough to be mapped separately, but they were not separated because of poor accessibility and low intensity of use.

Adaton soil formed in silty material. This soil is on broad upland flats. Slopes mostly are less than 1 percent. Felker soil formed in silty marine sediment. This soil is on slightly higher upland flats. Slopes are 0 to 2 percent. Mapped areas range from about 20 to 1,000 acres.

The deep, poorly drained Adaton soil makes up about 50 percent of this association. Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The upper part of the subsoil is light brownish gray, mottled silt loam to a depth of about 20 inches. The middle part is light brownish gray, mottled silty clay loam to a depth of about 42 inches. The lower part of the subsoil is grayish brown, mottled silty clay loam to a depth of 72 inches.

This Adaton soil is moderate in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is slow, and the available water capacity is high. The water table is at or near the surface late in winter and early in spring.

The deep, somewhat poorly drained Felker soil makes up about 35 percent of this association. Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil is yellowish brown or brownish yellow, mottled silt loam to a depth of about 50 inches. The middle part is mottled gray, yellowish brown, and brownish yellow clay loam to a depth of about 63 inches. The lower part is mottled red, gray, and yellowish brown clay loam to a depth of 74 inches.

This Felker soil is low in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid throughout. Permeability is moderately slow, and the available water capacity is high. The water table is within 2 or 3 feet of the surface late in winter and early in spring.

The remaining 15 percent of this association consists of small areas of Blevins, Louin, Muskogee, and Wrightsville soils.

The Adaton soil is moderately suited to cultivated crops. The Felker soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and small grains. Slow surface runoff and the excess water can cause farming operations to be delayed for several days after a rain. With good management, including adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

The Adaton soil is moderately suited to pasture. The Felker soil is well suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, dallisgrass, and white clover.

Adaton and Felker soils have high potential productivity for commercial production of wood crops. Adapted trees include loblolly pine, shortleaf pine, and sweetgum. The Adaton soil has moderate seedling mortality and severe equipment use limitations because of wetness. The Felker soil has moderate seedling mortality and moderate equipment use limitations because of wetness. These limitations can be partially overcome by managing and logging during the drier seasons.

These soils are moderately suited or poorly suited to most urban uses. The Adaton soil has severe limitations for urban uses. Wetness is a severe limitation for dwellings and small commercial buildings. Possible corrective measures include installing drainage to divert surface and subsurface water away from the structure or placing the structure on a higher lying area of the map unit. Wetness is a severe limitation for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material are possible corrective measures. Slow permeability and wetness are severe limitations for use of this soil as a septic tank absorption field. These limitations can be difficult or impractical to overcome, sometimes making use of an alternative site necessary. However, the effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

Felker soils have moderate or severe limitations for urban uses. Wetness and shrinking and swelling are moderate limitations for dwellings and small commercial buildings. Shaping the land so that surface water moves away from the structure can minimize the effects of wetness; properly designed foundations with extra reinforcement can minimize the effects of shrinking and swelling. Low strength, wetness, and shrinking and swelling are moderate limitations for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material are possible corrective measures. Wetness and slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Adaton soil is in capability subclass IIIw and woodland suitability group 2w9. The Felker soil is in capability subclass IIw and woodland suitability group 2w8.

2—Amy silt loam, 0 to 1 percent slopes. This deep, poorly drained, level soil is on upland flats and low stream terraces. Individual areas of the soil range from about 20 to 500 acres.

Typically, the surface layer is grayish brown silt loam about 3 inches thick. The subsurface layer is light brownish gray, mottled silt loam to a depth of about 8 inches. The upper part of the subsoil is light brownish gray, mottled silt loam to a depth of about 26 inches. The middle part is gray, mottled silty clay loam to a depth of about 42 inches. The lower part of the subsoil is light brownish gray, mottled silty clay loam to a depth of about 58 inches. The underlying material is gray, mottled fine sandy loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. It is strongly acid to extremely acid throughout. Permeability is slow, and the available water capacity is high. The water table is at or near the surface in winter and spring.

Included with this soil in mapping are a few small areas of Bowie, Guyton, Harleston, Sacul, and Smithton soils. Bowie and Sacul soils are on higher upland landscapes. Guyton and Smithton soils are on similar landscapes. Harleston soils are on slightly higher side slopes and upland flats.

This Amy soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and winter small grains. Runoff is slow, and the excess water can cause farming operations to be delayed several days after a rain. With good management, including adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, dallisgrass, and white clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, bottom land oaks, and sweetgum. Management concerns include moderate seedling mortality and severe equipment use limitations because of wetness. These limitations can be partially overcome by managing and logging during the drier seasons.

This soil is poorly suited to most urban uses. Wetness is a severe limitation for dwellings and small commercial buildings. This limitation can be minimized by installing drainage systems to divert surface and subsurface water away from the structure or by placing the structure on a higher lying area of the map unit. Low strength and wetness are severe limitations for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material can help prevent damage caused by these limitations. Wetness and slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Amy soil is in capability subclass IIIw and woodland suitability group 2w9.

3—Angie fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on hilltops and convex hillsides. Individual areas of the soil range from about 25 to 150 acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsurface layer is pale brown fine sandy loam to a depth of about 13 inches. The upper part of the subsoil is strong brown silty clay loam to a depth of about 23 inches. The next part is yellowish brown, mottled silty clay loam to a depth of about 38 inches. The next part is yellowish brown, mottled silty clay to a depth of about 50 inches. The lower part of the subsoil is light brownish gray, mottled clay to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or medium acid in the surface and subsurface layers and extremely acid to medium acid in the subsoil. Permeability is slow, and the available water capacity is high. The water table is at a depth of 3 to 5 feet late in winter and early in spring.

Included with this soil in mapping are a few small areas of Bowie, Sacul, and Warnock soils. All of these soils are on similar landscapes.

This Angie soil is well suited to cultivated crops. Adapted crops are soybeans, grain sorghum, and truck crops. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bahiagrass, common bermudagrass, improved bermudagrass, and crimson clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, and sweetgum. There are no significant limitations for woodland use and management.

This soil is poorly suited to most urban uses. Shrinking and swelling is a severe limitation for dwellings and small commercial buildings. A properly designed foundation that has extra reinforcement is a possible corrective measure. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material can help prevent damage caused by these limitations. Wetness and slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Angie soil is in capability subclass IIe and woodland suitability group 2o7.

4—Angie fine sandy loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on convex hillsides. Individual areas of the soil range from about 50 to 400 acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsurface layer is pale brown fine sandy loam to a depth of about 13 inches. The upper part of the subsoil is strong brown silty clay loam to a depth of about 23 inches. The next part is yellowish brown, mottled silty clay loam to a depth of about 38 inches. The next part is yellowish brown, mottled silty clay to a depth of about 50 inches. The lower part of the subsoil is light brownish gray, mottled clay to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or medium acid in the surface and subsurface layers and extremely acid to medium acid in the subsoil. Permeability is slow, and the available water capacity is high. The water table is at a depth of 3 to 5 feet late in winter and early in spring.

Included with this soil in mapping are a few small areas of Bowie, Sacul, and Warnock soils. All of these soils are on similar landscapes.

This Angie soil is moderately suited to cultivated crops. Adapted crops are soybeans, grain sorghum, and truck crops. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, common bermudagrass, improved bermudagrass, and crimson clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, and sweetgum. There are no significant limitations for woodland use and management.

This soil is poorly suited to most urban uses. Shrinking and swelling is a severe limitation for dwellings and small commercial buildings. A properly designed foundation that has extra reinforcement is a possible corrective measure. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material can help prevent damage caused by these limitations. Wetness and slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Angie soil is in capability subclass IIIe and woodland suitability group 2o7.

5—Bibb fine sandy loam, frequently flooded. This deep, poorly drained, moderately permeable, level soil is on flood plains of local drains and major streams. Individual areas of the soil range from about 25 acres to several hundred acres. Slopes are 0 to 1 percent.

Typically, the surface layer is dark grayish brown fine sandy loam about 4 inches thick. The next layer is light gray fine sandy loam to a depth of about 12 inches. The upper part of the underlying material, to a depth of about 40 inches, is light brownish gray, mottled fine sandy loam that has common strata of sandy loam and silt loam. The middle part, to a depth of about 60 inches, is light brownish gray, mottled silt loam that has common strata of sandy loam. The lower part to a depth of 72 inches is light brownish gray, mottled fine sandy loam that has common strata of sandy loam and silt loam.

This soil is low in natural fertility and low in organic matter content. It is strongly acid or very strongly acid throughout. Permeability is moderate, and the available water capacity is medium. The soil is generally flooded each year for brief periods in winter and spring. The water table is at or near the surface in winter and spring.

Included with this soil in mapping are a few small areas of Guyton soils, a few areas of Bibb soils that have a silt loam or loamy sand surface layer, and areas that flood less often than once in two years.

This Bibb soil is unsuited to cultivated crops. It is moderately suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, dallisgrass, and white clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted species include loblolly pine, bottom land oaks, and sweetgum. Management concerns include severe seedling mortality and severe equipment use limitations because of flooding and wetness. These limitations can be partially overcome by managing and logging during the drier seasons.

This soil is poorly suited to most urban uses. Flooding and wetness are severe limitations for dwellings and small commercial buildings. These limitations can be difficult or impractical to overcome, sometimes making the use of an alternative site necessary. Wetness and flooding are severe limitations for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material can minimize damage caused by these limitations. Flooding and wetness are severe limitations for use of this soil as a septic tank absorption field. These limitations can be difficult or impractical to overcome, sometimes making use of an alternative site necessary.

This Bibb soil is in capability subclass Vw and woodland suitability group 2w9.

6—Blevins silt loam, 1 to 3 percent slopes. This deep well drained, nearly level soil is on upland flats and hillsides. Individual areas of the soil range from about 10 to 300 acres.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsurface layer is light yellowish brown silt loam to a depth of about 9 inches. The upper part of the subsoil is strong brown silt loam to a depth of about 30 inches. The middle part is yellowish brown, mottled silt loam to a depth of about 65 inches. The lower part of the subsoil is yellowish brown, mottled silty clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is moderate, and the available water capacity is high.

Included with this soil in mapping are a few small areas of Adaton, Felker, Guyton, Smithdale, and Wrightsville soils. The Adaton and Wrightsville soils are in slightly lower positions. Guyton soils are on flood plains of local drains and major streams. Smithdale and Felker soils are on similar landscapes.

This Blevins soil is well suited to cultivated crops. Adapted crops are soybeans, grain sorghum, and truck crops. Erosion is a moderate hazard if cultivated crops are grown. The use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bahiagrass, common bermudagrass, improved bermudagrass, and crimson clover.

This soil has high potential productivity for commercial wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, black walnut, and upland oaks. There are no significant limitations for woodland use or management.

This soil is moderately suited to most urban uses. Limitations are slight for dwellings and small commercial buildings. Low strength is a severe limitation for local roads and streets. Constructing roadbeds on suitable subgrade or base material can help offset the effects of this limitation. Moderate permeability is a moderate limitation for use of this soil as a septic tank absorption field. The effect of this limitation can be minimized by increasing the size of the absorption field.

This Blevins soil is in capability subclass IIe and woodland suitability group 2o7.

7—Blevins silt loam, 3 to 8 percent slopes. This deep well drained, gently sloping soil is on upland flats and hillsides. Individual areas of the soil range from about 15 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsurface layer is light yellowish brown silt loam to a depth of about 9 inches. The upper part of the subsoil is strong brown silt loam to a depth of about 30 inches. The middle part is yellowish brown, mottled silt loam to a depth of about 65 inches. The lower part of the subsoil is yellowish brown, mottled silty clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is moderate, and the available water capacity is high.

Included with this soil in mapping are a few small areas of Adaton, Felker, Guyton, Smithdale, and Wrightsville soils. The Adaton and Wrightsville soils are in slightly lower positions. Guyton soils are on flood plains of local drains and major streams. Smithdale and Felker soils are on similar landscapes.

This Blevins soil is moderately suited to cultivated crops. Adapted crops are soybeans, grain sorghum, and truck crops. Erosion is a severe hazard if cultivated crops are grown. The use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bahiagrass, common bermudagrass, improved bermudagrass, and crimson clover.

This soil has high potential productivity for commercial wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, black walnut, and upland oaks. There are no significant limitations for woodland use or management.

This soil is moderately suited to most urban uses. Limitations are slight for dwellings. Slope is a moderate limitation for small commercial buildings. Shaping the land and using designs that conform to the natural slope can help offset the effects of this limitation. Low strength is a severe limitation for local roads and streets. Constructing roadbeds on suitable subgrade or base material can help offset the effects of this limitation. Moderate permeability is a moderate limitation for use of this soil as a septic tank absorption field. The effects of this limitation can be minimized by increasing the size of the absorption field.

This Blevins soil is in capability subclass IIIe and woodland suitability group 2o7.

8—Bowie fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on hilltops and convex hillsides. Individual areas of the soil range from about 10 to 400 acres.

Typically, the surface layer is dark brown fine sandy loam about 6 inches thick. The subsurface layer is light yellowish brown fine sandy loam to a depth of about 10 inches. The upper part of the subsoil is yellowish brown sandy clay loam to a depth of about 30 inches. The lower part of the subsoil is yellowish brown, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderately slow, and the available water capacity is medium. The water table is at a depth of about 5 feet for short periods in winter and spring.

Included with this soil in mapping are a few small areas of Angie, Ora, Sacul, and Smithdale soils. All of these soils are on similar landscapes.

This Bowie soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, small grains, and truck crops. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, and upland oaks. There are no significant limitations for woodland use or management.

This soil is well suited to poorly suited to most urban uses. Limitations are slight for dwellings, small commercial buildings, and local roads and streets. Moderately slow permeability is a severe limitation for use of this soil as a septic tank absorption field. The effect of this limitation can be minimized by increasing the size of the absorption field or using specially designed alternate systems.

This Bowie soil is in capability subclass IIe and woodland suitability group 3o7.

9—Bowie fine sandy loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on hilltops and side slopes. Individual areas of the soil range from about 10 to 600 acres.

Typically, the surface layer is dark brown fine sandy loam about 6 inches thick. The subsurface layer is light yellowish brown fine sandy loam to a depth of about 10 inches. The upper part of the subsoil is yellowish brown sandy clay loam to a depth of about 30 inches. The lower part of the subsoil is yellowish brown, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderately slow, and the available water capacity is medium. The water table is at a depth of about 5 feet for short periods in winter and spring.

Included with this soil in mapping are a few small areas of Angie, Ora, Sacul, and Smithdale soils. All of these soils are on similar landscapes.

This Bowie soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, small grains, and truck crops. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming (fig. 2) help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, and upland oaks. There are no significant limitations for woodland use or management.

This soil ranges from well suited to poorly suited to most urban uses. Limitations are slight for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. Shaping the land and using designs that conform to the natural slope can minimize the effects of this limitation. Moderately slow permeability is a severe limitation for use of this soil as a septic tank absorption field. The effect of this limitation can be minimized by increasing the size of the absorption field or using specially designed alternate systems.

This Bowie soil is in capability subclass IIIe and woodland suitability group 3o7.

10—Briley loamy fine sand, 1 to 3 percent slopes. This deep, well drained, nearly level soil is on hilltops and hillsides. Individual areas of the soil range from about 10 to 100 acres.

Typically, the surface layer is brown loamy fine sand about 6 inches thick. The subsurface layer is light yellowish brown loamy fine sand to a depth of about 22 inches. The subsoil is red, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is medium. Crops respond well to fertilization, and tilth is easy to maintain.

Included with this soil in mapping are a few small areas of Bowie, Darco, Darden, Ruston, and Smithdale soils. All of these soils are on similar landscapes. Also included are soils that are similar to Briley soils but have brown matrix colors in the upper part of the subsoil.

This Briley soil is moderately suited to cultivated crops. Adapted crops include vegetables and truck crops. The hazard of droughtiness is the main limitation. Wind erosion is a moderate hazard on clean-tilled areas. Crop rotation and stripcropping are practices that help reduce runoff, control erosion, and conserve moisture.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, and sericea lespedeza.

This soil has moderately high potential productivity for commercial wood crops, and this is the main use. Loblolly pine is the main tree grown. Management concerns include moderate seedling mortality because of droughtiness.

This soil is well suited to most urban uses. Limitations are slight for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields.

This Briley soil is in capability subclass IIIs and woodland suitability group 3s2.

11—Briley loamy fine sand, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on hilltops and hillsides. Individual areas of the soil range from about 10 to 100 acres.

Typically, the surface layer is brown loamy fine sand about 6 inches thick. The subsurface layer is light yellowish brown loamy fine sand to a depth of about 22 inches. The subsoil is red, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is medium. Crops respond well to fertilization, and tilth is easy to maintain.

Included with this soil in mapping are a few small areas of Bowie, Darco, Darden, Ruston, and Smithdale soils. All of these soils are on similar landscapes. Also included are soils that are similar to Briley soils but have brown matrix colors in the upper part of the subsoil.

This Briley soil is poorly suited to cultivated crops, although some vegetables and truck crops are grown. Droughtiness and wind and water erosion are moderate hazards on clean-tilled areas. Crop rotation and stripcropping are practices that help reduce runoff, control erosion, and conserve moisture.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass and bermudagrass.

Figure 2.—Contour farming on Bowie fine sandy loam, 3 to 8 percent slopes, reduces runoff and helps control erosion.

This soil has moderately high potential productivity for commercial wood crops, and this is the main use. Loblolly pine is the main tree grown. Management concerns include moderate seedling mortality because of droughtiness.

This soil is well suited to most urban uses. Limitations are slight for dwellings, local roads and streets, and septic tank absorption fields. Slope is a moderate limitation for small commercial buildings. Shaping the land and using designs that conform to the natural slope can help offset the effects of this limitation.

This Briley soil is in capability subclass IIIe and woodland suitability group 3s2.

12—Darden-Darco loamy fine sands, 2 to 8 percent slopes. This complex consists of Darden and Darco soils in areas so intermingled that they could not be separated at the scale selected for mapping. Mapped areas range from about 25 to 150 acres. This complex is on hilltops and hillsides. Individual areas of each soil are about 2 to 5 acres.

Darden soil makes up about 55 percent of each mapped area. Typically, the surface layer is dark brown loamy fine sand about 6 inches thick. The underlying material is dark brown loamy fine sand to a depth of about 45 inches, strong brown loamy fine sand to a depth of about 75 inches, and very pale brown sand to a depth of 82 inches.

Darden soil is low in natural fertility and low in organic matter content. Reaction is very strongly acid or strongly acid throughout. Permeability is rapid, and the available water capacity is low.

Darco soil makes up about 25 percent of each mapped area. Typically, the surface layer is dark brown loamy fine sand about 11 inches thick. The subsurface layer is yellowish brown loamy fine sand to a depth of about 24 inches and light yellowish brown loamy fine sand to a depth of about 42 inches. The subsoil is yellowish red sandy clay loam to a depth of about 52 inches and red, mottled sandy clay loam to a depth of 80 inches.

Darco soil is low in natural fertility and low in organic matter content. Reaction is very strongly acid or strongly acid throughout. Permeability is moderate, and the available water capacity is low.

The remaining 20 percent of this complex consists of areas of Bowie, Briley, Ruston, Sacul, and Smithdale soils. Briley soils are on similar landscapes. Bowie, Ruston, Sacul, and Smithdale soils are on slightly lower side slopes.

These Darden and Darco soils are poorly suited to cultivated crops. Adapted crops include small grains, grain sorghum, and truck crops. Droughtiness is a severe hazard if cultivated crops are grown. If management practices such as minimum tillage and contour cultivation are used, clean-tilled crops that leave a large amount of residue can be grown on the less sloping areas.

These soils are poorly suited to pasture. Adapted pasture plants include bermudagrass and bahiagrass. Droughtiness is the main hazard for forage production.

These soils have moderately high potential productivity for commercial wood crops, and this is the main use. Adapted trees include loblolly pine and shortleaf pine. Management concerns for both soils include moderate equipment limitations and severe seedling mortality.

These soils are moderately suited to most urban uses. Limitations are slight for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. Shaping the land and using designs that conform to the natural slope are possible corrective measures. Poor filtering capability is a severe limitation for septic tank absorption fields. Use of an alternative site is sometimes necessary to prevent possible contamination of ground water.

These soils are in capability subclass IVs and woodland suitability group 3s3.

13—Felker silt loam, 0 to 2 percent slopes. This deep, somewhat poorly drained, level to nearly level soil is on upland flats. Individual areas of the soil range from about 20 to 500 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil is yellowish brown or brownish yellow mottled silt loam to a depth of about 50 inches. The middle part is mottled gray, yellowish brown, and brownish yellow clay loam to a depth of about 63 inches. The lower part of the subsoil is mottled red, gray, and yellowish brown clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid throughout, except for areas where the surface layer has been limed. Permeability is moderately slow, and the available water capacity is high. The water table is within 2 or 3 feet of the surface late in winter and early in spring.

Included with this soil in mapping are a few small areas of Adaton, Wrightsville, and Muskogee soils. The Adaton and Wrightsville soils are in slightly lower positions. The Muskogee soils are in positions similar to those of the Felker soils.

This Felker soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and small grains. Surface runoff is slow, and the excess water can cause farming operations to be delayed several days after a rain. With good management, including adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown.

This soil is well suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and white clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, upland oaks, and sweetgum. Management concerns include moderate seedling mortality and moderate equipment use limitations because of wetness.

This soil is moderately suited or poorly suited to most urban uses. Wetness and shrinking and swelling are moderate limitations for dwellings and small commercial buildings. Shaping the land so that surface water moves away from the structure helps to minimize the effects of wetness; properly designed foundations that have extra reinforcement help offset the effects of shrinking and swelling. Low strength, wetness, and shrinking and swelling are moderate limitations for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material can help prevent damage caused by these limitations. Wetness and slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Felker soil is in capability subclass IIw and woodland suitability group 2w8.

14—Gore silt loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on narrow terraces. Individual areas of the soil range from about 20 to 200 acres.

Typically, the surface layer is brown silt loam about 3 inches thick. The upper part of the subsoil is strong brown silt loam to a depth of about 5 inches. The middle part is red mottled clay to a depth of about 20 inches. The lower part of the subsoil is mottled yellowish red, yellowish brown, red, and light brownish gray clay to a depth of about 45 inches. The underlying material is red clay to a depth of 72 inches.

This soil is moderate in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid in the surface layer and the upper part of the subsoil. The middle part of the subsoil ranges from very strongly acid to neutral, and the lower part ranges from very strongly acid to moderately alkaline. The underlying material ranges from medium acid to moderately alkaline. Permeability is very slow, and the available water capability is high. This soil shrinks and cracks when dry, and the cracks seal when the soil is wet.

Included with this soil in mapping are a few small areas of Felker, Muskogee, and Smithdale soils. All of these soils are on similar landscapes.

This Gore soil is moderately suited to cultivated crops. Adapted crops are soybeans, grain sorghum, and truck crops. Erosion is a severe hazard if cultivated crops are grown. The use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is moderately suited to pasture. Adapted pasture plants include common bermudagrass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees are loblolly pine and shortleaf pine. Management concerns include moderate seedling mortality and moderate equipment use limitations because of the clayey texture.

This soil is poorly suited to most urban uses. Shrinking and swelling is a severe limitation for dwellings and small commercial buildings. Properly designed foundations that have extra reinforcement help offset the effects of this limitation. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material can help prevent damage caused by these limitations. Very slow permeability is a severe limitation for use of this soil as a septic tank absorption field. The effect of this limitation can be minimized by increasing the size of the absorption field or using specially designed alternate systems.

This Gore soil is in capability subclass IIIe and woodland suitability group 3c2.

15—Gore silt loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on hilltops and side slopes. Individual areas of the soil range from about 20 to 150 acres.

Typically, the surface layer is brown silt loam about 3 inches thick. The upper part of the subsoil is strong brown silt loam to a depth of about 5 inches. The middle part is red mottled clay to a depth of about 20 inches. The lower part is mottled yellowish red, yellowish brown, red, and light brownish gray clay to a depth of about 45 inches. The underlying material is red clay to a depth of 72 inches.

This soil is moderate in natural fertility and low in organic matter content. Reaction is medium acid to very strongly acid in the surface layer and the upper part of the subsoil. The middle part of the subsoil ranges from very strongly acid to neutral, and the lower part ranges from very strongly acid to moderately alkaline. The underlying material ranges from medium acid to moderately alkaline. Permeability is very slow, and the available water capacity is high. This soil shrinks and cracks when dry; the cracks seal when the soil is wet.

Included with this soil in mapping are a few small areas of Felker, Muskogee, and Smithdale soils. All of these soils are on similar landscapes.

This Gore soil is poorly suited to cultivated crops. Adapted crops are soybeans, grain sorghum, and truck crops. Erosion is a very severe hazard if cultivated crops are grown. The use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is moderately suited to pasture. Adapted pasture plants include common bermudaarass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine and shortleaf pine. Management concerns include moderate seedling mortality and moderate equipment use limitations because of the clayey texture.

This soil has severe limitations for most urban uses. Shrinking and swelling is a severe limitation for dwellings and small commercial buildings. Properly designed foundations that have extra reinforcement help offset the effect of this limitation. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material can help prevent damage caused by these limitations. Very slow permeability is a severe limitation for use of this soil as a septic tank absorption field. The effects of this limitation can be minimized by increasing the size of the absorption field or using specially designed alternate systems.

This Gore soil is in capability subclass IVe and woodland suitability group 3c2.

16—Guyton silt loam, frequently flooded. This deep, poorly drained, slowly permeable, level soil is on flood plains of local drains and major streams. Individual areas of the soil range from about 50 acres to several thousand acres. Slopes are 0 to 1 percent.

Typically, the surface layer is grayish brown, mottled silt loam about 8 inches thick. The subsurface layer is light brownish gray, mottled silt loam to a depth of about 14 inches. The upper part of the subsoil is light brownish gray, mottled silt loam to a depth of about 28 inches. The lower part of the subsoil is gray, mottled silty clay loam to a depth of about 55 inches. The underlying material is gray silt loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. It is very strongly acid to medium acid in the surface layer, subsurface layer, and subsoil. It ranges from very strongly acid through moderately alkaline in the underlying material. Permeability is slow, and the available water capacity is high. This soil is generally flooded for brief to long periods throughout the year (fig. 3). The water table is at or near the surface in winter and spring.

Included with this soil in mapping are a few small areas of Bibb soils, a few areas of Guyton soils that have a fine sandy loam surface layer, and areas along Dorcheat Bayou that have a moderate to high content of sodium in the subsoil and underlying material.

This Guyton soil is unsuited to cultivated crops. It is poorly suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, dallisgrass, and white clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, bottom land oaks, and sweetgum. Management concerns include moderate seedling mortality and severe equipment use limitations because of flooding and wetness. These limitations can be partially overcome by managing and logging during the drier seasons.

This soil is poorly suited to most urban uses. The hazard of flooding and wetness are severe limitations for dwellings and small commercial buildings. These limitations can be difficult or impractical to overcome, sometimes making use of an alternative site necessary. Low strength, wetness, and the hazard of flooding are severe limitations for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material can help offset damage caused by these limitations. The hazard of flooding, wetness, and slow permeability are severe limitations for use of this soil as a septic tank absorption field. These limitations can be difficult or impractical to overcome, sometimes making an alternative site necessary.

This Guyton soil is in capability subclass Vw and woodland suitability group 2w9.

17—Harleston very fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on upland flats and low terraces. Individual areas of this soil range from about 20 to 400 acres.

Typically, the surface layer is dark grayish brown very fine sandy loam about 5 inches thick. The subsurface layer is pale brown very fine sandy loam to a depth of about 9 inches. The upper part of the subsoil is yellowish brown, mottled very fine sandy loam to a depth of about 34 inches. The lower part is gray, mottled loam to a depth of 72 inches.

This soil is low in natural fertility and low to moderate in organic matter content. Reaction ranges from strongly acid to extremely acid throughout. Permeability is moderate, and the available water capacity is medium. The water table is within 2 or 3 feet of the surface in winter and spring.

Included with this soil in mapping are a few small areas of Bibb, Bowie, Amy, Smithton, and Warnock soils. Amy and Smithton soils are on similar landscapes. Bibb soils are along small stream channels. Bowie and Warnock soils are in slightly higher positions.

This Harleston soil is well suited to cultivated crops. Adapted crops are grain sorghum and small grains. Runoff is slow, and the excess water can cause farming operations to be delayed several days after a rain. With good management, including adequate drainage, clean-tilled crops that leave a large amount of residue can be safely grown.

This soil is well suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and crimson clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, upland oaks, and sweetgum. Management concerns include moderate equipment use limitations because of wetness. This can be partially overcome by logging during the drier season.

This soil is moderately suited to most urban uses. Wetness is a moderate limitation for dwellings and small commercial buildings. Shaping the land to divert surface water away from the structure or placing the structure on a higher lying area of the map unit are possible corrective measures. Wetness is a moderate limitation for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material are possible corrective measures. Wetness is a severe limitation for use of this soil as a septic tank absorption field. The effects of this limitation can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Harleston soil is in capability subclass IIw and woodland suitability group 2w8.

18—Harleston very fine sandy loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on the lower part of hillsides. Individual areas of this soil range from about 20 to 400 acres.

Typically, the surface layer is dark grayish brown very fine sandy loam about 5 inches thick. The subsurface layer is pale brown very fine sandy loam to a depth of about 9 inches. The upper part of the subsoil is yellowish brown, mottled very fine sandy loam to a depth of about 34 inches. The lower part of the subsoil is gray, mottled loam to a depth of 72 inches.

Figure 3.—Flooding on Guyton silt loam, frequently flooded, is a limitation for many uses.

This soil is low in natural fertility and low to moderate in organic matter content. Reaction ranges from strongly acid to extremely acid throughout. Permeability is moderate, and the available water capacity is medium. The water table is within 2 or 3 feet of the surface in winter and spring.

Included with this soil in mapping are a few small areas of Bibb, Bowie, Amy, Smithton, and Warnock soils. Amy and Smithton soils are on similar landscapes. Bibb soils are along small stream channels. Bowie and Warnock soils are in slightly higher positions.

This Harleston soil is moderately suited to cultivated crops. Adapted crops are grain sorghum and small grains. Erosion is a severe hazard if cultivated crops are grown. The use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is moderately suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and crimson clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, upland oaks, and sweetgum. Management concerns include moderate equipment use limitations because of wetness. This can be partially overcome by logging during the drier season.

This soil is moderately suited to most urban uses. Wetness is a moderate limitation for dwellings, and wetness and slope are moderate limitations for small commercial buildings. Shaping the land to divert surface water away from the structure or placing the structure on a higher lying area of the map unit can help offset the effects of wetness; shaping the land and using designs that conform to the natural slope can help offset the effects of slope. Wetness is a moderate limitation for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material are possible corrective measures. Wetness is a severe limitation for use of this soil as a septic tank absorption field. The effects of this limitation can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Harleston soil is in capability subclass IIe and woodland suitability group 2w8.

19—Louin silty clay loam, 0 to 1 percent slopes. This deep, somewhat poorly drained, level soil is on upland flats. The surface configuration consists of cycles of microbasins and microknolls repeated at 8- to 18-foot intervals. Individual areas of the soil range from about 100 to 1,000 acres.

Typically, the surface layer is dark grayish brown silty clay loam about 5 inches thick. The upper part of the subsoil is light brownish gray, mottled silty clay to a depth of about 16 inches. The middle part is gray, mottled clay to a depth of about 41 inches. The lower part of the subsoil is light brownish gray, mottled clay to a depth of 70 inches.

This soil is low in natural fertility and low to moderate in organic matter content. Reaction is strongly acid or very strongly acid; the lower part of the soil ranges from medium acid to mildly alkaline. Permeability is very slow, and the available water capacity is high. The soil shrinks and cracks when dry. It expands when wet, and the cracks seal. The water table is at or near the surface, and the microbasins are generally ponded for brief to long periods, in winter and spring.

Included with this soil in mapping are a few small areas of Adaton, Felker, and Wrightsville soils. Also included are a few areas that have a silt loam or silty clay surface layer.

This Louin soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and small grains. Runoff is slow, and the excess water can cause farming operations to be delayed several days after a rain. With good management, including adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, and white clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, water oak, white oak, and sweetgum. Management concerns include moderate seedling mortality and severe equipment use limitations because of the clayey texture and wetness. These limitations can be partially overcome by managing and logging during the drier seasons. Most of the trees grow on the microknolls; water generally ponds in the microbasins in winter and spring, increasing the seedling mortality.

This soil is poorly suited to most urban uses. Wetness and high shrink-swell potential are severe limitations for dwellings and small commercial buildings. These limitations can be difficult or impractical to overcome, sometimes making use of an alternative site necessary. However, the effects of wetness can be minimized by shaping the land and installing drainage to divert surface and subsurface water away from the structure, and the effects of shrinking and swelling can be minimized by installing properly designed foundations that have extra reinforcement. Wetness and high shrink-swell potential are severe limitations for local roads and streets. Installing drainage systems and constructing roadbeds on coarser grained, raised subgrade or base material help offset damage caused by these limitations. Wetness and very slow permeability are severe limitations for use of this soil as a septic tank absorption field. These limitations can be difficult or impractical to overcome, sometimes making use of an alternative site necessary.

This Louin soil is in capability subclass IIIw and woodland suitability group 3w9.

20—Muskogee silt loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on stream terraces. Individual areas of the soil range from about 20 to 700 acres.

Typically, the surface layer is brown silt loam about 4 inches thick. The upper part of the subsoil is yellowish brown, mottled silt loam to a depth of about 18 inches. The next part is yellowish brown, mottled silty clay loam to a depth of about 28 inches. The next part is mottled light brownish gray, yellowish brown, and red silty clay to a depth of about 43 inches. The next part is yellowish red, mottled silty clay to a depth of about 65 inches. The lower part of the subsoil is red, mottled clay to a depth of 78 inches.

This soil is moderate in natural fertility and moderate in organic matter content. Reaction is medium acid to extremely acid in the upper part and very strongly acid to mildly alkaline in the lower part. Permeability is slow, and the available water capacity is high. The water table is within 1 or 2 feet of the surface in winter and spring.

Included with this soil in mapping are a few small areas of Felker, Gore, and Wrightsville soils. The Felker and Gore soils are in positions similar to those of the Muskogee soils. The Wrightsville soils are on lower landscapes.

This Muskogee soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, small grains, and truck crops. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, crimson clover, and annual lespedeza.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, upland oaks, and sweetgum. There are no significant limitations for woodland use or management.

This soil is poorly suited to most urban uses. Wetness and shrinking and swelling are severe limitations for dwellings and small commercial buildings. Shaping the land and installing drainage systems to divert surface and subsurface water away from the structure or placing the structure on a higher lying area of the map unit help offset the effects of wetness; properly designed foundations that have extra reinforcement help offset the effects of shrinking and swelling. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material helps prevent damage caused by these limitations. Wetness and slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effects of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Muskogee soil is in capability subclass IIe and woodland suitability group 3o7.

21—Oil-waste land. Oil-waste land is mainly along small drainageways and tributaries, but a few areas are on upland flats. It consists of areas in which liquid waste from oil wells and drilling operations, mainly oil and saltwater, has accumulated. Some of these areas are elongated, and others are irregular in shape. Individual areas range from about 5 to 75 acres. Slopes range from 0 to 5 percent.

About 85 to 100 percent of the areas lack a plant cover and are severely eroded. Soil characteristics cannot be determined with any degree of accuracy because they have been altered by erosion and pollution from oil and salt wastes. The original surface layer has been lost in the more sloping areas (fig. 4), and this material has been deposited in level creek channels (fig. 5). The result has been the spreading of oil and salt after rainfall in the level creek bottoms, causing loss of vegetation. The water table is saline with up to 50,000 parts per million salts (there is about 35,000 parts per million in sea water). The salt is predominantly sodium chloride, but significant amounts of other salts are present, including borates.

Included with this land type in mapping are a few small areas of Bibb, Bowie, Guyton, Harleston, Smithton, and Warnock soils. Bibb and Guyton soils are on similar landscapes. Bowie and Warnock soils are on higher upland landscapes. Harleston and Smithton soils are on slightly higher landscapes and upland flats.

These areas are not suitable for any farm use. Establishing vegetation is difficult or impractical.

Oil-waste land is in capability subclass VIIIs and has not been assigned a woodland suitability group.

22—Ora fine sandy loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on hilltops and hillsides. Individual areas of the soil range from about 25 to 300 acres.

Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer is yellowish brown fine sandy loam to a depth of about 7 inches. The upper part of the subsoil is strong brown fine sandy loam to a depth of about 11 inches. The next part is yellowish red sandy clay loam to a depth of about 19 inches. The next part is a yellowish red, mottled, sandy clay loam fragipan to a depth of about 28 inches. The next part is a mottled red, yellowish red, yellowish brown, and light gray sandy clay loam fragipan to a depth of about 55 inches. The lower part of the subsoil is red, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction ranges from strongly acid to extremely acid throughout. Permeability is moderate in the upper part of the subsoil and moderately slow in the fragipan. The available water capacity is medium. The water table is within 2 to 3.5 feet of the surface late in winter and early in spring.

Included with this soil in mapping are a few small areas of Bowie, Sacul, and Smithdale soils. All of these soils are on similar landscapes.

This Ora soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and truck crops. Erosion is a severe hazard if cultivated crops are grown. The fragipan restricts root penetration and water movement. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

Figure 4.—Erosion has taken place on this upland area of Oil-waste land.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, and crimson clover.

This soil has moderately high potential productivity for commercial wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, and upland oaks. There are no significant limitations for woodland use or management.

This soil is moderately suited or poorly suited to most urban uses. Wetness is a moderate limitation for dwellings, and wetness and slope are moderate limitations for small commercial buildings. Shaping the land to divert surface water away from the structure helps offset the effects of wetness; shaping the land and using designs that conform to the natural slope can help overcome the slope limitation. Low strength and wetness are moderate limitations for local roads and streets. Installing drainage systems and constructing roadbeds on suitable subgrade or base material are possible corrective measures. Wetness and slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Ora soil is in capability subclass IIIe and woodland suitability group 3o7.

23—Ruston fine sandy loam, 1 to 3 percent slopes. This deep, well drained, nearly level soil is on ridgetops and upper side slopes. Individual areas of the soil range from about 10 to 250 acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsurface layer is pale brown fine sandy loam to a depth of about 12 inches. The upper part of the subsoil is yellowish red sandy clay loam to a depth of about 17 inches. The next part is red sandy clay loam to a depth of about 36 inches. The next part is yellowish red fine sandy loam that has pockets and streaks of yellowish brown fine sandy loam to a depth of about 45 inches. The next part is yellowish red, mottled sandy clay loam to a depth of about 60 inches. The lower part of the subsoil is red, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction ranges from slightly acid to very strongly acid in surface and subsurface layers and from very strongly acid to medium acid in the subsoil. Permeability is moderate, and the available water capacity is high.

Included with this soil in mapping are a few small areas of Angie, Bowie, Briley, Darco, Darden, Sacul, and Smithdale soils. All of these soils are on similar landscapes.

Figure 5.—Bottom land areas collect deposition from eroding upland areas of Oil-waste land.

This Ruston soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, small grains, truck crops, and cotton. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine and shortleaf pine. There are no significant limitations for woodland use or management.

This soil is well suited or moderately suited to most urban uses. Limitations are slight for dwellings and small commercial buildings. Low strength is a moderate limitation for local roads and streets. Constructing roadbeds on suitable subgrade or base material helps offset damage caused by this limitation. Moderate permeability is a moderate limitation for use of this soil as a septic tank absorption field. The effect of this limitation can be minimized by increasing the size of the absorption field.

This Ruston soil is in capability subclass IIe and woodland suitability group 3o1.

24—Sacul fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on hilltops and side slopes. Individual areas of the soil range from about 15 to 100 acres.

Typically, the surface layer is dark brown fine sandy loam about 3 inches thick. The subsurface layer is dark yellowish brown fine sandy loam to a depth of about 7 inches. The upper part of the subsoil is red clay to a depth of about 20 inches. The next part is red mottled silty clay to a depth of about 30 inches. The next part is mottled red, light brownish gray, and strong brown silty clay to a depth of about 43 inches. The lower part of the subsoil is mottled light gray, red, and strong brown silty clay loam to a depth of about 54 inches. The upper part of the underlying material is light brownish gray mottled clay loam to a depth of about 63 inches. The lower part is light brownish gray sandy clay loam that has streaks and strata of strong brown sandy loam to a depth of 80 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is slow, and the available water capacity is high. The water table is within 2 to 4 feet of the surface late in winter and early in spring.

Included with this soil in mapping are a few small areas of Angie, Bowie, Smithdale, and Warnock soils. All of these soils are on similar landscapes.

This Sacul soil is moderately suited to cultivated crops. Adapted crops are soybeans, grain sorghum, and truck crops. Erosion is a severe hazard if cultivated crops are grown. The use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, common bermudagrass, improved bermudagrass, and annual lespedeza.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine and shortleaf pine. Clayey texture is a moderate limitation for use of equipment in managing and harvesting the tree crop. Logging in drier seasons helps to overcome this limitation.

This soil is poorly suited to most urban uses. Shrinking and swelling is a severe limitation for dwellings and small commercial buildings. Properly designed foundations that have extra reinforcement help offset the effects of this limitation. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material is a possible corrective measure. Slow permeability and wetness are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Sacul soil is in capability subclass IIIe and woodland suitability group 3c2.

25—Sacul fine sandy loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on hilltops and side slopes. Individual areas of the soil range from about 20 to 600 acres.

Typically, the surface layer is dark brown fine sandy loam about 3 inches thick. The subsurface layer is dark yellowish brown fine sandy loam to a depth of about 7 inches. The upper part of the subsoil is red clay to a depth of about 20 inches. The next part is red mottled silty clay to a depth of about 30 inches. The next part is mottled red, light brownish gray, and strong brown silty clay to a depth of about 43 inches. The lower part of the subsoil is mottled light gray, red, and strong brown silty clay loam to a depth of about 54 inches. The upper part of the underlying material is light brownish gray mottled clay loam to a depth of about 63 inches. The lower part is light brownish gray sandy clay loam that has streaks and strata of strong brown sandy loam to a depth of 80 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is slow, and the available water capacity is high. The water table is 2 to 4 feet from the surface late in winter and early in spring.

Included with this soil in mapping are a few small areas of Angie, Bowie, Smithdale, and Warnock soils. All of these soils are on similar landscapes.

Figure 6.—Cattle grazing bahiagrass on Sacul fine sandy loam, 3 to 8 percent slopes.

This Sacul soil is poorly suited to cultivated crops, but soybeans, grain sorghum, and truck crops are grown. Erosion is a very severe hazard if cultivated crops are grown. The use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass (fig. 6), common bermudagrass, improved bermudagrass, and annual lespedeza.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use (fig. 7). Adapted trees include loblolly pine and shortleaf pine (fig. 8). Clayey texture is a moderate limitation for use of equipment in managing and harvesting the tree crop. Logging in drier seasons helps to overcome this limitation.

This soil is poorly suited to most urban uses. Shrinking and swelling is a severe limitation for dwellings and small commercial buildings. Properly designed foundations that have extra reinforcement help offset the effects of this limitation. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material is a possible corrective measure. Slow permeability and wetness are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Sacul soil is in capability subclass IVe and woodland suitability group 3c2.

Figure 7.—A clear-cut area on Sacul fine sandy loam, 3 to 8 percent slopes. The land has been prepared and is ready for planting pine seedlings.

26—Sacul fine sandy loam, 8 to 12 percent slopes. This deep, moderately well drained, moderately sloping soil is on hilltops and side slopes. Individual areas of the soil range from about 25 to 150 acres.

Typically, the surface layer is dark brown fine sandy loam about 3 inches thick. The subsurface layer is dark yellowish brown fine sandy loam to a depth of about 7 inches. The upper part of the subsoil is red clay to a depth of about 20 inches. The next part is red mottled silty clay to a depth of about 30 inches. The next part is mottled red, light brownish gray, and strong brown silty clay to a depth of about 43 inches. The lower part of the subsoil is mottled light gray, red, and strong brown silty clay loam to a depth of about 54 inches. The upper part of the underlying material is light brownish gray mottled clay loam to a depth of about 63 inches. The lower part is light brownish gray sandy clay loam that has streaks and strata of strong brown sandy loam to a depth of 80 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is slow, and the available water capacity is high. The water table is within 2 to 4 feet of the surface late in winter and early in spring.

Included with this soil in mapping are a few small areas of Angie, Bowie, Smithdale, and Warnock soils. All of these soils are on similar landscapes.

This Sacul soil is unsuited to cultivated crops. It is poorly suited to pasture. Adapted pasture plants include bahiagrass, common bermudagrass, improved bermudagrass, and annual lespedeza.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine and shortleaf pine. Clayey texture is a moderate limitation for use of equipment in managing and harvesting the tree crop. Logging in drier seasons helps to overcome this limitation.

This soil is poorly suited to most urban uses. Shrinking and swelling is a severe limitation for dwellings, and shrinking and swelling and slope are severe limitations for small commercial buildings. Properly designed foundations that have extra reinforcement help offset the effects of shrinking and swelling; shaping the land and using designs that conform to the natural slope can help offset the effects of the slope limitation. Low strength and shrinking and swelling are severe limitations for local roads and streets. Constructing roadbeds on coarser grained subgrade or base material helps prevent damage

Figure 8.—A well managed stand of loblolly pine on Sacul fine sandy loam, 3 to 8 percent slopes.

caused by these limitations. Slow permeability and wetness are severe limitations for use of this soil as a septic tank absorption field. The effects of these limitations can be minimized by increasing the size of the absorption field or using specially designed alternate systems.

This Sacul soil is in capability subclass VIe and woodland suitability group 3c2.

27—Smithdale fine sandy loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on ridgetops and side slopes. Individual areas of the soil range from about 10 to 500 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer is yellowish brown fine sandy loam to a depth of about 11 inches. The upper part of the subsoil is red sandy clay loam to a depth of about 28 inches. The middle part is red, mottled sandy clay loam to a depth of about 40 inches. The lower part of the subsoil is red sandy loam that has pockets and streaks of clean sand grains to a depth of 80 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout, except for the surface layer in areas that have been limed. Permeability is moderate, and the available water capacity is high.

Included with this soil in mapping are a few small areas of Angie, Bowie, Briley, Ruston, and Sacul soils, and a few areas of Smithdale soils that have gravel content of 10 to 15 percent throughout the profile. All of these soils are on similar landscapes.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, small grains, truck crops, and cotton. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture (fig. 9). Adapted plants include bermudagrass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine and shortleaf pine. There are no significant limitations for woodland use or management.

This soil is well suited or moderately suited to most urban uses. Limitations are slight for dwellings and local roads and streets, but slope is a moderate limitation for small commercial buildings. Shaping the land and using designs that conform to the natural slope are possible corrective measures. Moderate permeability is a moderate limitation for use of this soil as a septic tank absorption field. The effects of this limitation can be minimized by increasing the size of the absorption field.

This Smithdale soil is in capability subclass IIIe and woodland suitability group 3o1.

28—Smithton fine sandy loam, 0 to 2 percent slopes. This deep, poorly drained, level to nearly level soil is on upland flats and stream terraces. Individual areas of the soil range from about 25 to 300 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 6 inches thick. The subsurface layer is grayish brown fine sandy loam to a depth of about 13 inches. The upper part of the subsoil is light brownish gray, mottled fine sandy loam to a depth of about 27 inches. The middle part is light brownish gray, mottled loam to a depth of about 45 inches. The lower part of the subsoil is gray, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid or very strongly acid throughout. Permeability is moderately slow, and the available water capacity is medium. The water table is at or near the surface late in winter and early in spring.

Included with this soil in mapping are a few small areas of Amy, Bibb, Bowie, Guyton, and Harleston soils. The Amy, Bibb, and Guyton soils are on similar landscapes. The Bowie and Harleston are in slightly higher upland positions.

This soil is moderately suited to cultivated crops. Adapted crops include grain sorghum and winter small grains. Runoff is moderately slow, and the excess water can cause farming operations to be delayed several days after a rain. With good management, including adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, common bermudagrass, tall fescue, dallisgrass, and white clover.

This soil has high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, bottom land oaks, upland oaks, and sweetgum. Management concerns include moderate seedling mortality and severe limitations for use of equipment because of wetness. The effect of these limitations can be partially overcome by managing and logging during the drier season.

This soil is poorly suited to most urban uses. Wetness is a severe limitation for dwellings and small commercial buildings. The effect of this limitation can be minimized by installing drainage systems to divert surface and subsurface water away from the structure or by placing the structure on a higher lying area of the map unit. Wetness is a severe limitation for local roads and streets. Installing drainage systems and constructing roadbeds on suitable raised fill material are possible corrective measures. Wetness and moderately slow permeability are severe limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

Figure 9.—Smithdale fine sandy loam, 3 to 8 percent slopes, is well suited to pasture and hayland.

This Smithton soil is in capability subclass IIIw and woodland suitability group 2w9.

29—Warnock fine sandy loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on hilltops and convex hillsides. Individual areas of the soil range from about 15 to 400 acres.

Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsurface layer is light yellowish brown fine sandy loam to a depth of about 16 inches. The upper part of the subsoil is yellowish brown sandy clay loam to a depth of about 28 inches. The next part is yellowish brown, mottled sandy clay loam to a depth of about 42 inches. The next part is mottled red, light brownish gray, yellowish brown, and strong brown sandy clay loam to a depth of about 58 inches. The lower part of the subsoil is gray, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid to extremely acid throughout. Permeability is moderate, and the available water capacity is medium. The water table is at a depth of 4 to 6 feet late in winter and early in spring.

Included with this soil in mapping are a few small areas of Angie, Briley, Sacul, and Smithdale soils. All of these soils are on similar landscapes.

This Warnock soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and small grains. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is well suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, and upland oaks. There are no significant limitations for woodland use or management.

This soil is well suited or moderately suited to most urban uses. Limitations are slight for dwellings and small commercial buildings. Low strength is a moderate limitation for local roads and streets. Constructing roadbeds on suitable subgrade or base material helps offset damage caused by this limitation. Moderate permeability and wetness are moderate limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Warnock soil is in capability subclass IIe and woodland suitability group 3o1.

30—Warnock fine sandy loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on hilltops and hillsides. Individual areas of the soil range from about 25 to 500 acres.

Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsurface layer is light yellowish brown fine sandy loam to a depth of about 16 inches. The upper part of the subsoil is yellowish brown sandy clay loam to a depth of about 28 inches. The next part is yellowish brown, mottled sandy clay loam to a depth of about 42 inches. The next part is mottled red, light brownish gray, yellowish brown, and strong brown sandy clay loam to a depth of about 58 inches. The lower part of the subsoil is gray, mottled sandy clay loam to a depth of 72 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid to extremely acid throughout. Permeability is moderate, and the available water capacity is medium. The water table is at a depth of 4 to 6 feet late in winter and early in spring.

Included with this soil in mapping are a few small areas of Angie, Briley, Sacul, and Smithdale soils. All of these soils are on similar landscapes.

This Warnock soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and small grains. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, including grasses and legumes, and contour farming help reduce runoff and control erosion.

This soil is moderately suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, and crimson clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, and upland oaks. There are no significant limitations for woodland use or management.

This soil is moderately suited to most urban uses. Limitations are slight for dwellings. Slope is a moderate limitation for small commercial buildings. Shaping the land and using designs that conform to the natural slope are possible corrective measures. Low strength is a moderate limitation for local roads and streets. Constructing roadbeds on suitable subgrade or base material helps offset damage caused by this limitation. Moderate permeability and wetness are moderate limitations for use of this soil as a septic tank absorption field. The effect of these limitations can be minimized by increasing the size of the absorption field, using properly designed drainage systems, or using specially designed alternate systems.

This Warnock soil is in capability subclass IIIe and woodland suitability group 3o1.

31—Wrightsville silty clay loam, 0 to 1 percent slopes. This deep, poorly drained, level soil is on upland flats. One area of about 4,000 acres is in the southwestern corner of the county.

Typically, the surface layer is grayish brown silty clay loam about 4 inches thick. The subsurface layer is light gray, mottled silty clay loam to a depth of about 17 inches. The upper part of the subsoil is gray, mottled silty clay to a depth of about 37 inches. The next part is grayish brown, mottled silty clay to a depth of about 46 inches. The next part is light brownish gray, mottled silty clay to a depth of about 56 inches. The next part is light gray, mottled silty clay to a depth of about 70 inches. The lower part of the subsoil is yellowish red, mottled silty clay to a depth of 80 inches.

This soil is low in natural fertility and low in organic matter content. Reaction is strongly acid to extremely acid in the surface and subsurface layers, medium acid to extremely acid in the upper part of the subsoil, and extremely acid to moderately alkaline in the lower part of the subsoil. Permeability is very slow, and the available water capacity is high. The water table is 6 to 18 inches below the surface in winter and spring.

Included with this soil in mapping are a few small areas of Adaton, Felker, and Louin soils. The Adaton and Louin soils are in positions similar to those of the Wrightsville soils. The Felker soils are in slightly higher positions.

This Wrightsville soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and small grains. Runoff is slow, and the excess water can cause farming operations to be delayed several days after a rain. With good management, including adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown.

This soil is moderately suited to pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, dallisgrass, and white clover.

This soil has moderately high potential productivity for commercial production of wood crops, and this is the main use. Adapted trees include loblolly pine, shortleaf pine, bottom land oaks, and sweetgum. Management concerns include moderate seedling mortality and severe limitations for use of equipment because of wetness.

This soil is poorly suited to most urban uses. Wetness and shrinking and swelling are severe limitations for dwellings and small commercial buildings. Shaping the land, installing drainage to divert surface and subsurface water away from the structure, or placing the structure on a higher lying area of the map unit helps offset the effects of wetness; installing properly designed foundations that have extra reinforcement helps offset the effects of shrinking and swelling. Low strength, wetness, and shrinking and swelling are severe limitations for local roads and streets. Installing drainage systems and constructing roadbeds on coarser grained raised subgrade or base material are possible corrective measures. Wetness and very slow permeability are severe limitations for use of this soil as a septic tank absorption field. These limitations can be difficult or impractical to overcome, sometimes making use of an alternative site necessary.

This Wrightsville soil is in capability subclass IIIw and woodland suitability group 3w9.

Prime Farmland

Prime farmland is defined and discussed in this section, and the prime farmland soils in Columbia County are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table may qualify as prime farmland soils if this limitation is overcome by drainage. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

About 175,129 acres, or nearly 35.6 percent, of Columbia County is prime farmland. These areas are scattered throughout the county. The majority of the acreage is in forest and pasture.

A recent national trend in land use has been the conversion of some prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are wet, more erodible, droughty, or difficult to cultivate and less productive than prime farmland.

The following map units, or soils make up prime farmland in Columbia County. Some areas of these soils, however, are urban or built-up land, which is defined as any contiguous unit of land 10 acres or more in size that is used for nonfarm uses including housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each map unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

1	Adaton-Felker association, 0 to 2 percent slopes (where drained)
2	Amy silt loam, 0 to 1 percent slopes (where drained)
3	Angie fine sandy loam, 1 to 3 percent slopes
6	Blevins silt loam, 1 to 3 percent slopes
8	Bowie fine sandy loam, 1 to 3 percent slopes
13	Felker silt loam, 0 to 2 percent slopes
17	Harleston very fine sandy loam, 1 to 3 percent slopes
19	Louin silty clay loam, 0 to 1 percent slopes (where drained)
20	Muskogee silt loam, 1 to 3 percent slopes
23	Ruston fine sandy loam, 1 to 3 percent slopes
24	Sacul fine sandy loam, 1 to 3 percent slopes
27	Smithdale fine sandy loam, 3 to 8 percent slopes
28	Smithton fine sandy loam, 0 to 2 percent slopes (where drained)
29	Warnock fine sandy loam, 1 to 3 percent slopes
31	Wrightsville silty clay loam, 0 to 1 percent slopes (where drained)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Approximately 66,800 acres in Columbia County are used for crops and pasture. Acreage in crops and pasture has gradually decreased as more and more is used for urban development and other uses. The soils in Columbia County have good potential for increased production of food. Food production could be increased considerably by extending the latest crop production technology to all cropland in the survey area. This soil survey can greatly help in the application of such technology.

Crops—Erosion control is needed on sloping soils that are used for clean-tilled crops. Such control includes contour cultivation, terraces, grassed waterways, conservation tillage, or combinations of these. It is very important to leave residue from the previous crop on the soil surface for protection from wind and water erosion. Herbicides are available to aid in reducing tillage for weed control.

Annual cover crops or grasses and legumes should be grown regularly if the hazard of erosion is severe or if the crops grown leave only small amounts of residue. Row arrangement and suitable surface drainage are needed for dependable growth on wet areas. Many areas that are subject to frequent flooding are unsuited, or only marginally suited, to most crops commonly grown in the county.

A plowpan commonly develops in loamy soils that are improperly tilled or that are tilled frequently with heavy equipment. Keeping tillage to a minimum, varying the depth of tillage, and tilling when soil moisture content is favorable help prevent formation of a plowpan. Growing deep-rooted grasses and legumes helps break up the plowpan.

If left bare, many soils tend to puddle, pack, and crust during periods of heavy rainfall. Growing cover crops and managing crop residue help preserve or improve tilth.

Pasture—Perennial grasses or legumes, or mixtures of these, are grown for pasture and hay. The mixtures generally consist of either a summer or a winter perennial grass and a suitable legume.

Coastal bermudagrass, common bermudagrass, and Pensacola bahiagrass are the summer perennials most commonly grown. Coastal bermudagrass and Pensacola bahiagrass produce good quality forage. Tall fescue is the chief winter perennial grass now used in the survey area. However, it grows well only on soils that have favorable soil-moisture content. All of these grasses respond well to fertilizer, particularly to nitrogen. White clover, crimson clover, annual lespedeza, and sericea lespedeza are the most commonly grown legumes.

Proper grazing management is essential for high quality forage, stand survival, and erosion control. Brush and weed control, fertilization, and renovation of the pasture are also important.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c.*

The capability classification of each map unit is given in table 5 and in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Kelly M. Koonce, forester, Soil Conservation Service, helped prepare this section.

About 83 percent of the total land area of Columbia County is in woodland. These 408,684 acres are owned by 4,196 landowners. This ownership is 1 percent public, 20 percent industry, and 79 percent private.

The major forest timber types in Columbia County are—

- Loblolly pine-shortleaf pine (253,000 acres)
- Oak-pine (101,410 acres)
- Oak-hickory (18,000 acres)
- Oak, gum, cypress (36,274 acres)

The major forest timber size is—

- Saw logs (232,894 acres)
- Poles (126,689 acres)
- Seedling/sapling (49,101 acres)

Columbia County's wood-using industries are vital to the local economy. There are 22 wood-using industries within the county that produce the following products: lumber crossties, poles, roof trusses, wood turnings, custom cabinets, fuel cell forms, hardwood block, and beams.

The main tree species are loblolly pine, shortleaf pine, red oak, white oak, post oak, sweetgum, cherrybark oak, water oak, elms, and various hickories. All of the soils within the county can support trees that are associated with growing timber for profit, wildlife habitat, recreation, natural beauty, and conservation of soil and water.

Columbia County is one of the best counties in Arkansas for growing pine forest products. The site index (how high a tree will grow in 50 years for a particular soil) averages about 87 feet for loblolly pine.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the woodland suitability group symbol for each soil. Soils assigned the same woodland suitability group symbol require the same general management and have about the same productivity.

The first part of the *symbol*, a number, indicates the productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil; *c*, clay in the upper part of the soil; and *s*, sandy texture. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: w, c, and s. The third part of the symbol, a number, indicates the kind of trees for which the soils in the group are best suited and also indicates the severity of the hazard or limitation. Only the hazard of erosion, equipment limitation, and seedling mortality are considered in making these ratings. The numerals 1, 2, and 3 indicate slight, moderate, or severe limitations, respectively, and suitability for needle-leaved trees. The numerals 4, 5, and 6 indicate slight, moderate, or severe limitations, respectively, and suitability for broad-leaved trees. The numerals 7, 8, and 9 indicate slight, moderate, or severe limitations, respectively, and suitability for both needle-leaved and broad-leaved trees.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in a well-managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Paul M. Brady, biologist, Soil Conservation Service, helped to prepare this section.

The abundant forests, interspersed pastures, fence rows, and numerous edges in Columbia County provide plentiful habitats for white-tailed deer, squirrels, bobwhite quail, mourning dove, coyotes, skunks, opossum, red fox, rabbits, owls, hawks, numerous nongame birds, small mammals, reptiles, and other wildlife.

Bottom land hardwood forests and swamps, such as those along Dorcheat Bayou and Cornie Bayou, support a variety of furbearers including muskrat, beaver, mink, nutria, raccoon, and gray fox. Swamp rabbit, wood duck, great blue heron, green heron, and other wading birds also inhabit these aquatic environments and areas adjacent to them.

In recent years relatively large deer, quail, and squirrel populations have been reported by hunters. Wild turkey stocked by the Arkansas Game and Fish Commission are increasing in number but are not yet generally abundant in Columbia County.

Columbia County has about 1,800 acres of ponds and lakes, including 60 lakes that are over 5 acres each in surface area. These ponds and lakes are used primarily for stock water and sport fishing for largemouth bass, bluegill, redear sunfish, and channel catfish (fig. 10).

Surveys by the Arkansas Game and Fish Commission show that Columbia County has only 29 miles of fishable streams (less than any other county in Arkansas) and the greatest need of any Arkansas county for additional fishing areas. Major streams in the county are Dorcheat Bayou, Cornie Bayou, Beech Creek, and Big Creek. They provide habitat for largemouth bass, bluegill, green and longear sunfish, chain pickerel, crappie, bowfin, channel catfish, bullheads, hog sucker, various minnows, shiners, and other warm water stream fish.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect

Figure 10.—This pond on Bowie fine sandy loam, 3 to 8 percent slopes, is used for recreation and livestock water.

the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places.

Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops grown in Columbia County are soybeans, corn, wheat, and milo.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, common and hybrid bermudagrass, bahiagrass, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are woolly croton, ragweed, partridge pea, and tick clover.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and greenbrier. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are amur honeysuckle, bicolor lespedeza, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and white-tailed deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

Figure 11.—A pond being built on Sacul fine sandy loam, 3 to 8 percent slopes. This soil has slight limitations for pond reservoir areas.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches (fig. 11). The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture *(6)*. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 16 and the results of chemical analysis in table 17. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the University of Arkansas at Fayetteville, Arkansas.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an oven-dry basis. The methods used in obtaining the data are indicated in the list that follows. Silt and clay particle-size distribution was determined by hydrometer method *(3)*. The codes in parentheses refer to published methods *(7)*.

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).

Organic matter—dry combustion (6A2a).

Extractable bases—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (6O2), sodium (6P2), potassium (6Q2).

Extractable acidity—barium chloride-triethanolamine I (6H1a).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1a).

Engineering Index Test Data

Table 18 shows laboratory test data for pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Arkansas State Highway and Transportation Department.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(8)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, siliceous, acid, thermic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (6)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (8)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Adaton Series

The Adaton series consists of deep, poorly drained, slowly permeable, level soils that formed in silty marine sediment. These soils are on upland flats. They are normally saturated with water from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 0 to 1 percent.

Adaton soils are geographically associated with Blevins, Felker, Louin, Muskogee, and Wrightsville soils. Blevins, Felker, and Muskogee soils are on slightly higher positions. Louin and Wrightsville soils are on landscape positions similar to that of the Adaton soils.

Blevins soils have less than 35 percent base saturation, are well drained, and are moderately permeable. Felker soils have less than 35 percent base saturation and have browner hue in the upper and middle parts of the Bt horizon. Louin soils have a fine control section and have high shrink-swell properties. Muskogee soils have brown matrix colors in the upper part of the Bt horizon and are moderately well drained. Wrightsville soils have a fine control section and have tongues of E material extending into the B horizon.

Typical pedon of Adaton silt loam; in an area of Adaton-Felker association, 0 to 2 percent slopes, in the SW1/4SE1/4SE1/4 sec. 26, T. 19 S., R. 23 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

Btg1—5 to 20 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; thin patchy clay films and silt coatings on faces of peds and in pores; few fine roots; very strongly acid; gradual wavy boundary.

Btg2—20 to 42 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films and silt coatings on faces of peds and in pores; few fine roots; very strongly acid; gradual wavy boundary.

Btg3—42 to 72 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; few manganese concretions, very strongly acid.

Thickness of the solum is more than 60 inches. Reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or less. The Ap horizon, where present, has hue of 10YR, value of 4, 5, or 6, and chroma of 2, 3, or 4. The E horizon, where present, has hue of 10YR, value of 6, and chroma of 2, 3, or 4. The E horizon has few to many mottles in shades of yellow and brown.

The B horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 1; or hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2. Mottles in shades of yellow and brown range from few to many and are less than 40 percent of the mass. Texture is silt loam or silty clay loam in the upper part and includes silty clay in the lower part.

Amy Series

The Amy series consists of deep, poorly drained, slowly permeable, level soils that formed in loamy marine sediment. These soils are on broad upland flats and low stream terraces. They are normally saturated with water from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 0 to 1 percent.

Amy soils are geographically associated with Harleston and Smithton soils on similar landscapes. Harleston soils have a coarse-loamy control section and are moderately well drained. Smithton soils have a coarse-loamy control section and have moderately slow permeability.

Typical pedon of Amy silt loam, 0 to 1 percent slopes; in the SW1/4NE1/4SW1/4 sec. 13, T. 16 S., R. 22 W.

A—0 to 3 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Eg—3 to 8 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct dark yellowish brown mottles and few fine faint light yellowish brown mottles; weak fine subangular blocky structure; friable; many fine roots; strongly acid; clear smooth boundary.

Btg1—8 to 26 inches; light brownish gray (10YR 6/2) silt loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds and in pores; few small dark concretions; very strongly acid; gradual wavy boundary.

Btg2—26 to 42 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; patchy clay films; very strongly acid; gradual wavy boundary.

Btg3—42 to 58 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; patchy clay films; very strongly acid; gradual wavy boundary.

Cg—58 to 72 inches; gray (10YR 6/1) fine sandy loam; few medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; very strongly acid.

Thickness of the solum ranges from 40 to 70 inches. Reaction is strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The Eg horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. Mottles in the A and Eg horizons are few to many in shades of brown.

The Btg horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2; or hue of 2.5Y, value of 6, and chroma of 2. Mottles in shades of brown range from few to many. Texture is silt loam or silty clay loam.

The Cg horizon has the same color range as the Btg horizon. Texture is silt loam, silty clay loam, or fine sandy loam.

Angie Series

The Angie series consists of deep, moderately well drained, slowly permeable, nearly level to gently sloping soils that formed in clayey marine sediment. These soils are on hilltops and side slopes. The water table is at a depth of 3 to 5 feet from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Angie soils are geographically associated with Bowie, Harleston, Sacul, and Warnock soils. Bowie, Sacul, and Warnock soils are on similar landscapes; Harleston soils are in lower side slope positions. Bowie soils have a fine-loamy control section, contain 5 to 30 percent plinthite, and do not have gray mottles within a depth of 30 inches. Harleston soils have a coarse-loamy control section, siliceous mineralogy, and moderate permeability. Sacul soils have a Bt horizon with more than 20 percent decrease in clay content within a depth of 60 inches, and they are redder in the upper part of the Bt horizon. Warnock soils have a fine-loamy control section and do not have gray mottles within a depth of 30 inches.

Typical pedon of Angie fine sandy loam, 1 to 3 percent slopes; in the NE1/4NE1/4SE1/4 sec. 31, T. 19 S., R. 21 W.

Ap—0 to 6 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.

E—6 to 13 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.

Bt1—13 to 23 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine roots; very strongly acid; clear smooth boundary.

Bt2—23 to 38 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct strong brown (7.5YR 5/6), light brownish gray (10YR 6/2), and red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; friable; thick continuous clay films on faces of peds; few fine roots and pores; very strongly acid; gradual wavy boundary.

Bt3—38 to 50 inches; yellowish brown (10YR 5/6) silty clay; common medium prominent red (2.5YR 4/8) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; few roots and pores; extremely acid; gradual wavy boundary.

Btg—50 to 72 inches; light brownish gray (10YR 6/1) clay; common medium prominent red (2.5YR 4/6) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; extremely acid.

Thickness of the solum ranges from 60 to 72 inches or more. Reaction ranges from strongly acid to medium acid in the A or Ap and E horizons and from extremely acid to medium acid in the B horizon.

The A or Ap and E horizons have hue of 10YR, value of 4, 5, or 6, and chroma of 2, 3, or 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 or 8; or hue of 10YR or 7.5YR, value of 4, and chroma of 6. Mottles are in shades of gray, brown, and red. The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles are red and brown. In some pedons the Btg horizon is mottled in shades of gray, brown, or red. Texture of the B horizon is silty clay loam, silty clay, or clay.

The Cg horizon, where present, has hue of 10YR, value of 5, 6, or 7, and chroma of 1 or 2. Mottles are in shades of red. Texture is silty clay loam, clay loam, silty clay, or clay.

Bibb Series

The Bibb series consists of deep, poorly drained, moderately permeable, level soils that formed in stratified loamy and sandy alluvial sediment. These soils are on flood plains of local drains and major streams. Flooding generally occurs each year for brief periods between December and May. The water table is seasonally high from December through April. The native vegetation was hardwoods or mixed hardwoods and pines. Slopes range from 0 to 1 percent.

Bibb soils are geographically associated with Guyton, Harleston, and Smithton soils. Guyton soils, which are on similar landscapes, have a fine-silty control section and more than 35 percent base saturation. Harleston soils, which are in slightly higher upland positions, do not have dominant gray colors immediately below the A horizon and are moderately well drained. Smithton soils, which are in slightly higher positions, do not have strata of different textures and have moderately slow permeability.

Typical pedon of Bibb fine sandy loam, frequently flooded; in the NE1/4SE1/4SE1/4 sec. 31, T. 16 S., R. 19 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; common fine roots; few fine brown stains around roots; strongly acid; abrupt smooth boundary.

Ag—4 to 12 inches; light gray (10YR 7/1) fine sandy loam; weak fine granular structure; friable; common fine roots; few brown stains; very strongly acid; clear wavy boundary.

Cg1—12 to 40 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; massive; few fine roots; common strata of sandy loam and silt loam; very strongly acid; clear wavy boundary.

Cg2—40 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; massive; few fine roots; common strata of sandy loam; very strongly acid; clear wavy boundary.

Cg3—60 to 72 inches; light brownish gray (2.5Y 6/2) fine sandy loam; few fine yellowish brown mottles; massive; common strata of sandy loam and silt loam; very strongly acid.

The soil is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 1, 2, or 3. The Ag horizon has hue of 10YR or 2.5Y, value of 4, 5, 6, or 7, and chroma of 1 or 2. Some pedons have brown and yellow mottles.

The Cg horizon has hue of 10YR or 2.5Y, value of 4, 5, 6, or 7, and chroma of 1 or 2. Mottles or strata are few to many in shades of red, yellow, and brown. Texture is loamy sand, sandy loam, fine sandy loam, loam, or silt loam, and is stratified.

Blevins Series

The Blevins series consists of deep, well drained, moderately permeable, nearly level to gently sloping soils that formed in marine or fluvial sediment. These soils are on upland flats and hillsides. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Blevins soils are geographically associated with Adaton, Felker, and Wrightsville soils. Adaton soils, which are in slightly lower positions, have more than 35 percent base saturation, are poorly drained, and have slow permeability. Felker soils, which are in similar positions, have mottles of chroma 2 or less within a depth of 30 inches and are somewhat poorly drained. Wrightsville soils, which are in lower positions, have a fine control section, gray matrix colors, and are poorly drained.

Typical pedon of Blevins silt loam, 1 to 3 percent slopes; in the SE1/4SW1/4SW1/4 sec. 22, T. 17 S., R. 23 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; very friable; many fine roots; strongly acid; gradual smooth boundary.

E—5 to 9 inches; light yellowish brown (10YR 6/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; very strongly acid; gradual smooth boundary.

Bt1—9 to 30 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; common fine roots; few fine pores; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—30 to 50 inches; yellowish brown (10YR 5/6) silt loam; few fine and medium distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots and pores; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B/E—50 to 65 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct light brownish gray (10YR 6/2) and red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine pores; thin patchy clay films on faces of peds; pockets and coatings of sand and silt; very strongly acid; gradual wavy boundary.

B't—65 to 72 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; very strongly acid.

Thickness of the solum ranges from 60 to 72 inches or more. Reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3; or hue of 10YR, value of 6, and chroma of 4.

The Bt1 and Bt2 horizons have hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8; or hue of 10YR, value of 5, and chroma of 4. Texture is loam, silt loam or silty clay loam. The B/E horizon has hue of 10YR, value of 5 or 6, chroma of 6 or 8; or hue of 10YR, value of 5, and chroma of 4. Mottles are in shades of gray and red. Texture is silt loam or loam. The B't horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. Mottles are in shades of gray and red. Texture is silt loam, silty clay loam, or clay loam.

Bowie Series

The Bowie series consists of deep, moderately well drained, moderately slowly permeable, nearly level to gently sloping soils that formed in thick loamy sediment of marine or alluvial origin. These soils are on hilltops and hillsides. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Bowie soils are geographically associated with Angie, Briley, Darco, Darden, Harleston, Ora, Ruston, Sacul, and Smithdale soils. All of these soils are on similar landscapes and contain less than 5 percent plinthite. Angie and Sacul soils have a clayey control section and gray mottles within a depth of 30 inches. Briley soils have a loamy control section and a sandy surface layer 20 to 40 inches thick. Darco soils have sandy epipedons more than 40 inches thick and have red matrix colors in the B horizon. Darden soils do not have a Bt horizon within a depth of 80 inches. Harleston soils have a coarse-loamy control section and mottles of chroma 2 or less within a depth of 30 inches. Ora soils have a fragipan and redder hue. Ruston soils have redder hue and a bisequal profile. Smithdale soils are not brittle and have redder hue.

Typical pedon of Bowie fine sandy loam, 3 to 8 percent slopes; in the SE1/4SE1/4NW1/4 sec. 7, T. 17 S., R. 21 W.

Ap—0 to 6 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

E—6 to 10 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

Bt—10 to 30 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; thin patchy clay films on faces of peds and in pores; few strongly cemented concretions of iron oxide; very strongly acid; gradual wavy boundary.

Btv1—30 to 45 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct red (2.5YR 4/6) mottles; weak coarse prismatic parting to moderate medium subangular blocky structure; hard, friable; few fine and medium roots; thin patchy clay films on faces of peds and in pores; 6 percent plinthite by volume; some brittle, yellowish brown and red material; very strongly acid; gradual wavy boundary.

Btv2—45 to 72 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct light brownish gray (10YR 6/2) and red (2.5YR 4/6) mottles; moderate coarse prismatic parting to moderate medium angular blocky structure; hard, friable; thin patchy clay films; 8 percent plinthite by volume; some brittle, yellowish brown and red material; very strongly acid.

Thickness of the solum ranges from 60 to 72 inches or more. Reaction is medium acid to very strongly acid in the A or Ap and E horizons and strongly acid or very strongly acid in the Bt and Btv horizon.

The Ap or A horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3; or hue of 10YR, value of 6, and chroma of 4.

The Bt horizon has hue of 10YR, value of 5, and chroma of 4, 6, or 8; hue of 10YR, value of 6, and chroma of 6 or 8; hue of 7.5YR, value of 5, and chroma of 6 or 8; or hue of 7.5YR, value of 6, and chroma of 8. Most pedons have few to common mottles of red, yellowish red, and strong brown. The Btv horizon has the same colors as the Bt horizon, and the lower part also contains few to many mottles in shades of gray, red, and brown. Content of plinthite in the Btv horizon ranges from about 5 to 9 percent, and parts of the horizon are brittle. Texture of the Bt and Btv horizons is sandy clay loam or clay loam.

Briley Series

The Briley series consists of deep, well drained, moderately permeable, nearly level to gently sloping soils that formed in sandy and loamy marine sediment. These soils are on broad interstream divides. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Briley soils are geographically associated with Bowie, Darco, Darden, Ruston, Smithdale, and Warnock soils. All of these soils are on similar landscapes. Bowie, Ruston, Smithdale, and Warnock soils have a loamy surface layer that is less than 20 inches thick, and Bowie soils have more than 5 percent plinthite. Darco and Darden soils have sandy epipedons more than 40 inches thick.

Typical pedon of Briley loamy fine sand, 3 to 8 percent slopes; in the SE1/4SW1/4SE1/4 sec. 30, T. 19 S., R. 20 W.

A—0 to 6 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; very friable; common medium and fine roots; medium acid; clear smooth boundary.

E—6 to 22 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; common medium and fine roots; strongly acid; clear smooth boundary.

Bt1—22 to 47 inches; red (2.5YR 5/8) sandy clay loam; few fine faint yellowish brown mottles; moderate medium subangular blocky structure; friable; slightly hard; thin patchy clay films on faces of peds; few fine roots; strongly acid; gradual wavy boundary.

Bt2—47 to 72 inches; red (2.5YR 4/6) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; firm; slightly hard; thin patchy clay films on faces of peds; few pockets of clean sand grains; very strongly acid.

Thickness of the solum ranges from 65 to 72 inches or more. Reaction is medium acid to very strongly acid throughout.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 3; or hue of 10YR, value of 4, and chroma of 2. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The BE horizon, where present, has hue of 10YR, value of 5, and chroma of 6. Texture is loamy fine sand or fine sandy loam. The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. The lower part of the Bt horizon has few to many mottles in shades of brown, with pockets of clean sand grains. In some pedons, the lower part of the Bt horizon has hue of 7.5YR, value of 5 or 6, and chroma of 6 or 8. Texture is fine sandy loam, sandy clay loam, or loam.

Darco Series

The Darco series consists of deep, well drained, moderately permeable, nearly level to gently sloping soils that formed in thick sandy and loamy sediment. These soils are on hilltops and hillsides. The native vegetation was mixed pines and hardwoods. Slopes range from 2 to 8 percent.

Darco soils are geographically associated with Bowie, Briley, Darden, Ruston, Sacul, and Smithdale soils. Bowie, Briley, Darden, and Ruston soils are in positions similar to those of the Darco soils. Sacul and Smithdale soils are on slightly lower side slopes. Bowie soils have a loamy surface layer that is less than 20 inches thick, do not have red matrix colors in the B horizon, and contain more than 5 percent plinthite within a depth of 60 inches. Briley soils have sandy epipedons 20 to 40 inches thick. Darden soils do not have a Bt horizon within a depth of 80 inches. Ruston soils have a loamy surface layer that is less than 20 inches thick and have bisequal profiles. Sacul soils have a clayey control section and have gray mottles within a depth of 30 inches. Smithdale soils have a loamy surface layer that is less than 20 inches thick.

Typical pedon of Darco loamy fine sand, in an area of Darden-Darco loamy fine sand, 2 to 8 percent slopes; in the SW1/4SW1/4NW1/4 sec. 12, T. 17 S., R. 22 W.

A—0 to 11 inches; dark brown (10YR 4/3) loamy fine sand; single grained; very friable; common fine and medium roots; very strongly acid; clear smooth boundary.

E1—11 to 24 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; very friable; common fine and medium roots; very strongly acid; clear wavy boundary.

E2—24 to 42 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; very friable; common fine and medium roots; very strongly acid; gradual smooth boundary.

Bt1—42 to 52 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—52 to 63 inches; red (2.5YR 4/8) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; hard; friable; common fine roots and pores; thin patchy clay films on faces of peds; common mica flakes; few seams of clean sand in root channels; very strongly acid; gradual smooth boundary.

Bt3—63 to 80 inches; red (2.5YR 5/8) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; hard; friable; common fine roots and pores; thin patchy clay films on faces of peds; many mica flakes; few seams of clean sand along root channels; very strongly acid.

Thickness of the solum is 80 inches or more. Reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2; or hue of 10YR, value of 4 or 5, and chroma of 3. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 7.5YR or 10YR, value of 5, and chroma of 6 or 8. Brownish and reddish mottles range from none to common. Mottles with chroma of 2 may appear below a depth of 50 inches in the Bt horizon. Texture is sandy loam or sandy clay loam.

Darden Series

The Darden series consists of deep, excessively drained, rapidly permeable, nearly level to gently sloping soils that formed in thick sandy sediment. These soils are on hilltops and hillsides. The native vegetation was mixed pines and hardwoods. Slopes range from 2 to 8 percent.

Darden soils are geographically associated with Bowie, Briley, Darco, Ruston, Sacul, and Smithdale soils. Bowie, Briley, Darco, and Ruston soils are in positions similar to those of the Darden soils. Sacul and Smithdale soils are on slightly lower side slopes. Bowie soils have sandy epipedons less than 20 inches thick and contain more than 5 percent plinthite within a depth of 60 inches. Briley soils have sandy epipedons 20 to 40 inches thick. Darco soils have sandy epipedons 40 to 72 inches thick and have an argillic horizon. Ruston soils have epipedons less than 20 inches thick and have bisequal profiles. Sacul soils have a clayey control section and have gray mottles within a depth of 30 inches. Smithdale soils have epipedons less than 20 inches thick and have an argillic horizon.

Typical pedon of Darden loamy fine sand, in an area of Darden-Darco loamy fine sands, 2 to 8 percent slopes; in the SE1/4SE1/4SW1/4 sec. 34, T. 15 S., R. 20 W.

A—0 to 6 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

C1—6 to 45 inches; dark brown (7.5YR 4/4) loamy fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

C2—45 to 75 inches; strong brown (7.5YR 5/6) loamy fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

C3—75 to 82 inches; very pale brown (10YR 7/3) sand; single grained; loose; very strongly acid.

Thickness of the sandy horizons exceeds 80 inches. Reaction is very strongly acid or strongly acid throughout.

The A or Ap horizon has hue of 10YR, value of 3, 4, 5, or 6, and chroma of 2, 3, 4, or 6; or hue of 7.5YR, value of 4, 5, or 6, and chroma of 2, 4, or 6.

The C horizon has hue of 10YR, value of 4, 5, 6, or 7, and chroma of 3, 4, 6, or 8; hue of 7.5YR, value of 5, 6, or 7, and chroma of 4, 6, or 8; or hue of 7.5YR, value of 4, and chroma of 4 or 6. Below a depth of 40 inches, thin discontinuous lamellae range from none to few. Texture is mostly loamy fine sand, but some pedons have strata of fine sand, loamy sand, or sand.

Felker Series

The Felker series consists of deep, somewhat poorly drained, moderately slowly permeable, level and nearly level soils that formed in silty marine sediment. These soils are on upland flats. The water table is seasonally high and is within a depth of 2 or 3 feet from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 0 to 2 percent.

Felker soils are geographically associated with Adaton, Blevins, Gore, Louin, Muskogee, Smithdale, and Wrightsville soils. Blevins, Gore, Muskogee, and Smithdale soils are on similar landscape positions. Adaton, Louin, and Wrightsville soils are in slightly lower positions. Adaton soils have more than 35 percent base saturation and have dominant chroma of 2 or less in the Bt horizon. Blevins soils do not have mottles with chroma of 2 or less within 30 inches of the surface and are well drained. Gore soils have a fine control section and dominant red hue in the upper part of the Bt horizon. Louin soils have a fine control section, high shrink-swell properties, and dominant matrix chroma of 2 or less in the upper part of the Bt horizon. Muskogee soils have more than 35 percent base saturation and are moderately well drained. Smithdale soils have a fine-loamy control section, have redder hue, and are well drained. Wrightsville soils have a fine control section, more than 35 percent base saturation, and tonguing of the E horizon into the B horizon.

Typical pedon of Felker silt loam, 0 to 2 percent slopes; in the NE1/4NW1/4NW1/4 sec. 24, T. 19 S., R. 23 W.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

Bt1—7 to 20 inches; yellowish brown (10YR 5/6) silt loam; common fine faint pale brown mottles; weak and moderate fine subangular blocky structure; friable; patchy clay films and silt coatings on faces of peds; many fine and medium roots; common fine and medium pores; very strongly acid; clear smooth boundary.

Bt2—20 to 36 inches; brownish yellow (10YR 6/6) silt loam; common medium faint light brownish gray (10YR 6/2), and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; patchy clay films and silt coatings on faces of peds; many fine and medium roots; common fine and medium pores; strongly acid; clear smooth boundary.

Bt3—36 to 50 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct gray (10YR 6/1) and few fine distinct red mottles; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; some peds coated with silt coatings 1/8 inch thick; few fine roots and pores; strongly acid; gradual wavy boundary.

Bt4—50 to 63 inches; mottled gray (10YR 6/1), yellowish brown (10YR 5/4), and brownish yellow (10YR 6/8) clay loam; moderate medium subangular blocky structure; firm; patchy clay films and silt coatings on faces of peds; few fine roots; few fine pores; strongly acid; gradual wavy boundary.

Bt5—63 to 74 inches; mottled red (2.5YR 4/8), gray (10YR 6/1), and yellowish brown (10YR 5/8) clay loam; strong medium subangular blocky structure; firm; patchy clay films on faces of peds; strongly acid.

Thickness of the solum is more than 60 inches. Reaction is medium acid to very strongly acid throughout, except for the surface layer in areas that have been limed.

The Ap or A horizon has hue of 10YR, value of 3, and chroma of 2; or hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The E horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The Bt1 and Bt2 horizons have hue of 10YR, value of 5 or 6, and chroma of 3, 4, 6, or 8, with mottles in shades of gray, red, brown, or yellow. Texture is silt loam or silty clay loam. The Bt3 horizon has hue of 10YR, value of 5, and chroma of 4, 6, or 8; or hue of 10YR, value of 6, and chroma of 1, 2, 3, or 4. It has mottles in shades of gray, brown, yellow, or red. Texture is silt loam, clay loam, or silty clay loam. The Bt4 and Bt5 horizons are coarsely mottled in hue of 10YR, value of 5, and chroma of 1, 4, 6, or 8; hue of 10YR, value of 6, and chroma of 1, 3, or 6; or hue of 5YR, value of 5, and chroma of 2. Texture is silt loam, silty clay loam, or clay loam.

Gore Series

The Gore series consists of deep, moderately well drained, very slowly permeable, nearly level to moderately sloping soils that formed in thick clayey alluvial sediment. These soils are on hilltops and side slopes. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Gore soils are geographically associated with Felker, Muskogee, and Smithdale soils. All of these soils are on similar landscapes. Felker soils have a fine-silty control section and do not have dominant red hues in the upper part of the Bt horizon. Muskogee soils have a fine-loamy control section and slow permeability. Smithdale soils have a fine-loamy control section and less than 35 percent base saturation.

Typical pedon of Gore silt loam, 3 to 8 percent slopes; in the NW1/4NE1/4NW1/4 sec. 17, T. 19 S., R. 22 W.

A—0 to 3 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.

BE—3 to 5 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; strongly acid; gradual wavy boundary.

Bt1—5 to 20 inches; red (2.5YR 5/6) clay; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films; few fine and medium roots; very strongly acid; gradual wavy boundary.

Bt2—20 to 45 inches; mottled yellowish red (5YR 5/6), yellowish brown (10YR 5/4), red (2.5YR 4/6), and light brownish gray (10YR 6/2) clay; moderate medium subangular blocky structure; firm; thin patchy clay films; few fine roots; very strongly acid; gradual wavy boundary.

2C—45 to 72 inches; red (2.5YR 4/6) clay; massive; very firm; few calcium carbonate concretions; common slickensides that do not intersect; slightly acid.

Thickness of the solum ranges from 40 to 60 inches. Reaction ranges from medium acid to very strongly acid in the A, E, and BE horizons. The upper part of the Bt horizon ranges from very strongly acid to neutral, and the lower part ranges from very strongly acid to moderately alkaline. The 2C horizon ranges from medium acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 3, 4, or 5, chroma of 1, 2, or 3. The E horizon, where present, has hue of 10YR, value of 5, 6, or 7, and chroma of 1, 2, or 3.

The BE horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 or 8. Texture is silt loam or silty clay loam. The upper part of the Bt horizon has hue of 2.5YR or 5YR, value of 3, 4, or 5, and chroma of 4 or 6. Mottles in shades of red, brown, and gray are present in most pedons. The lower part of the Bt horizon has the same color range as the upper part or is mottled in shades of red, brown, and gray. Texture of the Bt horizon is clay or silty clay.

The 2C horizon is a reddish clay or silty clay. Carbonate concretions range from none to common.

Guyton Series

The Guyton series consists of deep, poorly drained, slowly permeable, level soils that formed in silty alluvium. These soils are on flood plains of local drains and major streams. Flooding generally occurs throughout the year for brief to long periods. The water table is seasonally high from November through May. The native vegetation was hardwoods or mixed hardwoods and pines. Slopes range from 0 to 1 percent.

Guyton soils are geographically associated with Bibb, Harleston, and Smithton soils. Bibb soils are in similar landscapes while Harleston and Smithton soils are in slightly higher positions. None of these associated soils have tonguing of the E horizon into the Bt horizon. They all have a coarse-loamy control section and have less than 35 percent base saturation.

Typical pedon of Guyton silt loam, frequently flooded; in the NW1/4NE1/4SW1/ sec. 34, T. 16 S., R. 21 W.

A—0 to 8 inches; grayish brown (10YR 5/2) silt loam, common medium distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; strongly acid; clear smooth boundary.

Eg—8 to 14 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; strongly acid; clear irregular boundary.

B/E—14 to 28 inches; light brownish gray (2.5Y 6/2) silt loam; few medium distinct yellowish brown (10YR 5/6) mottles; friable; thin patchy clay films on faces of peds and in pores; tongues of gray (10YR 6/1) silt loam make up about 15 percent of the horizon; very strongly acid; gradual wavy boundary.

Btg—28 to 55 inches; gray (10YR 5/1) silty clay loam, common medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm; common thin clay films on faces of peds and in pores; common gray (10YR 6/1) silt coatings on faces of peds; very strongly acid; gradual wavy boundary.

Cg—55 to 72 inches; gray (10YR 5/1) silt loam; common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; strongly acid.

Thickness of the solum ranges from 50 to 72 inches or more. Reaction ranges from very strongly acid to medium acid in the A, E, B/E, and Btg horizons. Reaction in the Cg horizon ranges from strongly acid to moderately alkaline.

The A or Ap horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 2 or 3. The Eg horizon has hue of 10YR, value of 5, 6, or 7, and chroma of 1 or 2. Mottles in the A and Eg horizons are few to common in shades of brown.

The B/E and Btg horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. Mottles are few to many in shades of brown or gray. Texture is silt loam, silty clay loam, or clay loam.

The Cg horizon has the same color and texture range as the B/E and Btg horizons.

Harleston Series

The Harleston series consists of deep, moderately well drained, moderately permeable, nearly level to gently sloping soils that formed in thick loamy marine or alluvial sediment. These soils are on upland flats, hillsides, and low terraces. The water table is within a depth of 2 or 3 feet from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Harleston soils are geographically associated with Amy, Angie, Bibb, Bowie, Guyton, Smithton, and Warnock soils. Amy soils, which are on similar landscapes, have a fine-silty control section and are poorly drained. Angie soils, which are on slightly higher side slope positions, have a clayey control section, mixed mineralogy, and slow permeability. Bibb soils, which are along narrow stream channels, have dominant gray colors immediately below the A horizon and are poorly drained. Bowie soils, which are on similar landscapes, have a fine-loamy control section, contain more than 5 percent plinthite within a depth of 60 inches, and do not have mottles with chroma of 2 or less within a depth of 30 inches. Guyton soils, which are on adjacent flood plains, have a fine-silty control section and more than 35 percent base saturation. Smithton soils, which are in slightly lower positions, have dominant gray colors below the A horizon and are poorly drained. Warnock soils, which are on similar landscapes, have a fine-loamy control section and do not have mottles with chroma of 2 or less within a depth of 30 inches.

Typical pedon of Harleston very fine sandy loam, 1 to 3 percent slopes; in the NW1/4SW1/4SE1/4 sec. 26, T. 16 S., R. 21 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) very fine sandy loam; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

E—5 to 9 inches; pale brown (10YR 6/3) very fine sandy loam; weak fine subangular blocky structure; very friable; many fine roots; extremely acid; clear smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/4) very fine sandy loam; few medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—16 to 34 inches; yellowish brown (10YR 5/6) very fine sandy loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; few pockets of uncoated sand grains, very strongly acid; gradual smooth boundary.

Btg—34 to 72 inches; gray (10YR 6/1) loam; common medium distinct yellowish brown (10YR 5/6) and few fine and medium prominent red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few pockets of uncoated sand grains; very strongly acid.

Thickness of the solum is more than 60 inches. Reaction ranges from strongly acid to extremely acid throughout.

The A or Ap horizon has hue of 10YR, value of 3, and chroma of 1; hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 4 or 5, and chroma of 3. The E horizon has hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The Bt horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8; hue of 10YR, value of 5 or 6, and chroma of 4 or 6; or hue of 10YR, value of 5, and chroma of 8. Mottles with chroma of 2 or less range from none to many. Texture is very fine sandy loam, sandy loam, fine sandy loam, or loam. The Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2; or hue of 10YR, value of 6, and chroma of 1. The Btg horizon has few to many mottles in shades of brown and red, or it is mottled in shades of gray, red, and brown. Texture is sandy loam, loam, or sandy clay loam.

Louin Series

The Louin series consists of deep, somewhat poorly drained, very slowly permeable, level soils that formed in acid, clayey alluvium. These soils are on upland flats. The surface configuration consists of cycles of microbasins and microknolls repeated at 8- to 18-foot intervals. The water table is at or near the surface from January through April, and the microbasins are generally ponded for brief to long periods. The native vegetation was mixed pines and hardwoods. Slopes range from 0 to 1 percent.

Louin soils are geographically associated with Adaton, Felker, and Wrightsville soils. Adaton and Wrightsville soils are on landscapes similar to those of Louin soils. Felker soils are in slightly higher positions. Adaton soils have a fine-silty control section and do not have high shrink-swell properties. Felker soils have a fine-silty control section, do not have high shrink-swell properties, and do not have dominant matrix chromas of 2 or less in the upper part of the Bt horizon. Wrightsville soils have tongues of E material extending into the B horizon and have mixed mineralogy.

Typical pedon of Louin silty clay loam, 0 to 1 percent slopes; in a microbasin in the NE1/4SW1/4SW1/4 sec. 27, T. 19 S., R. 23 W.

O—1 inch to 0; partly decomposed pine needles and other forest debris.

A—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct dark yellowish brown mottles; moderate medium granular structure; firm; many fine and medium roots; very strongly acid; abrupt wavy boundary.

AC1—5 to 16 inches; light brownish gray (10YR 6/2) silty clay; many medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; very firm; many fine and medium roots; very strongly acid; clear wavy boundary.

AC2—16 to 30 inches; gray (10YR 6/1) clay; common medium distinct strong brown (7.5YR 5/6) mottles; few slickensides border wedge-shaped structural aggregates parting to moderate medium angular blocky structure; very firm; common fine and medium roots; very strongly acid; gradual wavy boundary.

AC3—30 to 41 inches; gray (10YR 6/1) clay; common medium distinct strong brown (7.5YR 5/6) mottles; common intersecting slickensides border wedge-shaped structural aggregates parting to strong medium and coarse angular blocky structure; very firm; common fine roots; very strongly acid; gradual wavy boundary.

AC4—41 to 56 inches; light brownish gray (2.5Y 6/2) clay; common medium distinct strong brown (7.5YR 5/6) and few fine prominent red mottles; common intersecting slickensides border wedge-shaped structural aggregates parting to strong medium and coarse angular blocky structure; very firm; few fine roots; very strongly acid; gradual wavy boundary.

AC5—56 to 69 inches; light brownish gray (2.5Y 6/2) clay; common medium prominent red (2.5YR 4/6) mottles; common intersecting slickensides border wedge-shaped structural aggregates parting to moderate medium angular blocky structure; very firm; few fine roots; very strongly acid.

Depth to intersecting slickensides ranges from 14 to 36 inches. Reaction is strongly acid or very strongly acid in the A and AC horizons. Surface configuration in undisturbed areas consists of cycles of microbasins and microknolls repeated at 8- to 18-foot intervals. Microbasins are 4 to 15 inches lower than microknolls, range from 3 to 8 feet across, and occupy 45 to 50 percent of the pedon dimension.

In the microbasins, the A horizon has hue of 10YR, value of 3 or 4, and chroma of 1; or hue of 10YR, value of 4, and chroma of 2. The upper part of the AC horizon has hue of 10YR, value of 5 or 6, and chroma of 1; hue of 10YR, value of 6, and chroma of 2; or hue of 2.5Y, value of 6, and chroma of 2. Mottles in shades of brown are few to many. The lower part of the AC horizon is mottled in shades of gray, brown, and red, or it has a gray matrix with mottles in shades of brown and red. Texture of the AC horizon is silty clay or clay.

On the microknolls, the A horizon has hue of 10YR, value of 3 or 4, and chroma of 2; hue of 10YR, value of 4 or 5, and chroma of 4; or hue of 10YR, value of 5, and chroma of 6. There are few to many mottles in shades of brown or gray. The upper part of the AC horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 4 or 6. Mottles in shades of brown or gray are few to many. The lower part of the AC horizon is similar to the lower part of the AC horizon in microbasins. Textures on the microknolls are the same as textures in the microbasins.

Muskogee Series

The Muskogee series consists of deep, moderately well drained, slowly permeable, nearly level soils that formed in silty material underlain by clayey sediment. These soils are on stream terraces. The water table is within 1 or 2 feet of the surface from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 3 percent.

Muskogee soils are geographically associated with Adaton, Felker, Gore, and Wrightsville soils. Adaton and Wrightsville soils are in lower positions. Felker and Gore soils are on landscapes similar to the Muskogee soils. Adaton soils have dominant chroma of 2 or less in the Bt horizon and are poorly drained. Felker soils have less than 35 percent base saturation and are somewhat poorly drained. Gore soils have a fine control section and very slow permeability. Wrightsville soils have a fine control section and tonguing of the E horizon extending into the B horizon.

Typical pedon of Muskogee silt loam, 1 to 3 percent slopes; in the NW1/4SE1/4SW1/4 sec. 33, T. 19 S., R. 22 W.

A—0 to 4 inches; brown (10YR 5/3) silt loam; weak medium granular structure; friable; many fine and medium roots; common fine pores; very strongly acid; clear smooth boundary.

BE—4 to 10 inches; yellowish brown (10YR 5/6) silt loam; few fine faint brown mottles; weak medium subangular blocky structure; friable; many fine roots; common fine pores; extremely acid; clear smooth boundary.

Bt1—10 to 18 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray and strong brown mottles; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine and medium roots; few fine pores; few fine black concretions; extremely acid; clear smooth boundary.

Bt2—18 to 28 inches; yellowish brown (10YR 5/8) silty clay loam; common medium distinct red (2.5YR 4/6), pale brown (10YR 6/3), and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; patchy clay films and silt coating on faces of peds; few fine roots; few fine pores; few fine black concretions; extremely acid; clear smooth boundary.

Bt3—28 to 43 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and red (2.5YR 4/6) silty clay; moderate medium subangular blocky structure; firm; thin patchy clay films; few fine roots; few fine pores; few fine black concretions; very strongly acid; gradual smooth boundary.

Bt4—43 to 55 inches; yellowish red (5YR 4/6) silty clay; common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; very firm; patchy clay films on faces of peds; few fine roots; few fine black concretions; very strongly acid; gradual smooth boundary.

Bt5—55 to 65 inches; yellowish red (5YR 4/6) silty clay; common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; very firm; patchy clay films on faces of peds; common fine black concretions; very strongly acid; gradual smooth boundary.

Bt6—65 to 78 inches; red (2.5YR 4/6) clay; few fine faint pale brown mottles; moderate medium subangular blocky structure; very firm; patchy clay films on faces of peds; few fine black concretions; strongly acid.

Thickness of the solum is 60 inches or more. Reaction is medium acid to extremely acid in the upper part and very strongly acid to mildly alkaline in the lower part.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The BE horizon has hue of 10YR, value of 5 or 6, and chroma of 4 or 6. Texture is silt loam or silty clay loam. The Bt1 and Bt2 horizons have hue of 10YR, value of 5, chroma of 4, 6, or 8, with mottles in shades of gray, brown, and red. Texture is silt loam or silty clay loam. The Bt3, Bt4, Bt5, and Bt6 horizons have hue of 10YR, value of 6 or 7, and chroma of 1 or 2; hue of 10YR, value of 5, and chroma of 6 or 8; or hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. There are mottles in shades of red, yellow, brown, and gray; or these horizons are mottled in these shades with no dominant color. Texture is silty clay or clay.

These soils are taxadjuncts to the Muskogee series because the pH is lower in the upper part of the Bt horizon than is typical for the Muskogee series. Use, behavior, and management are the same as for the Muskogee series, however.

Ora Series

The Ora series consists of deep, moderately well drained, moderately slowly permeable, gently sloping soils that formed in thick beds of loamy marine sediment. These soils are on hilltops and hillsides. The water table is seasonally high and within 2 or 3.5 feet of the surface from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 3 to 8 percent.

Ora soils are geographically associated with Bowie, Sacul, and Smithdale soils. All of these soils are on similar landscapes and do not have a fragipan. Bowie soils are yellowish brown and have more than 5 percent plinthite within a depth of 60 inches. Sacul soils have a clayey control section. Smithdale soils are well drained.

Typical pedon of Ora fine sandy loam, 3 to 8 percent slopes; in the NE1/4SE1/4SE1/4 sec. 24, T. 17 S., R. 22 W.

Ap—0 to 3 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; abrupt smooth boundary.

E—3 to 7 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

BE—7 to 11 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; very strongly acid; clear smooth boundary.

Bt1—11 to 19 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; few fine roots; very strongly acid; clear smooth boundary.

Btx1—19 to 28 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct red (2.5YR 4/8) and few fine distinct light gray mottles; weak medium prismatic parting to moderate medium subangular blocky structure; firm, brittle, and compact in about 60 percent of the volume; clay films on faces of peds; few fine roots; very strongly acid; clear smooth boundary.

Btx2—28 to 55 inches; mottled red (2.5YR 4/6), yellowish red (5YR 5/8), yellowish brown (10YR 5/6), and light gray (10YR 7/2) sandy clay loam; weak medium prismatic parting to moderate medium subangular blocky structure; firm, brittle, and compact in about 60 percent of the volume; clay films on faces of peds; very strongly acid; clear smooth boundary.

BC—55 to 72 inches; red (2.5YR 4/6) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and light gray (10YR 7/1) mottles; weak medium subangular blocky structure; friable; very strongly acid.

Thickness of the solum is more than 60 inches. Depth to the fragipan ranges from 18 to 42 inches. Reaction ranges from strongly acid to extremely acid.

The Ap and E horizons have hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 5 and chroma of 2, 3, or 4. Undisturbed pedons have an A horizon with hue of 10YR, value of 3, and chroma of 2; or hue of 10YR, value of 4, and chroma of 1.

The BE horizon has hue of 5YR or 7.5YR, value of 5, and chroma of 6 or 8. Texture is fine sandy loam or loam. The Bt horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 2.5YR, value of 4, and chroma of 4, 6, or 8. Texture is clay loam, sandy clay loam, or loam. The Btx and BC horizons are mottled in shades of yellow, brown, gray, and red; or they have yellowish red or red matrix colors with mottles in shades of yellow, brown, or gray. The Btx and BC horizons are sandy clay loam, loam, or sandy loam.

Ruston Series

The Ruston series consists of deep, well drained, moderately permeable, nearly level soils that formed in thick beds of loamy marine sediment. These soils are on ridgetops and upper side slopes. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 3 percent.

Ruston soils are geographically associated with Bowie, Briley, Darco, Darden, Sacul, Smithdale, and Warnock soils. All of these soils are on similar landscapes. Bowie soils contain more than 5 percent plinthite and have browner hue. Briley soils have sandy epipedons 20 to 40 inches thick. Darco soils have sandy epipedons 40 to 72 inches thick. Darden soils have a sandy control section and consist of uncoated quartz sand; sandy horizons extend to a depth of more than 80 inches. Sacul soils have a clayey control section and have gray mottles within a depth of 30 inches. Smithdale soils do not have a bisequal profile. Warnock soils have browner hue and do not have a bisequal profile.

Typical pedon of Ruston fine sandy loam, 1 to 3 percent slopes; in the NE1/4NW1/4NW1/4 sec. 29, T. 18 S., R. 18 W.

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

E—6 to 12 inches; pale brown (10YR 6/3) fine sandy loam; weak fine subangular blocky structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

Bt1—12 to 17 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films; sand grains bridged and coated with clay; common fine and medium roots; very strongly acid; clear wavy boundary.

Bt2—17 to 36 inches; red (2.5YR 4/8) sandy clay loam; moderate medium subangular blocky structure; friable; thin nearly continuous clay films; sand grains bridged and coated with clay; few fine roots; very strongly acid; gradual wavy boundary.

B/E—36 to 45 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; pockets of light yellowish brown (10YR 6/4) fine sandy loam E material makes up approximately 50 percent of the horizon; few thin patchy clay films; few fine roots; very strongly acid; gradual wavy boundary.

B't1—45 to 60 inches; yellowish red (5YR 5/6) sandy clay loam; common medium distinct yellowish brown (10YR 5/6), red (2.5YR 4/8), and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm and slightly brittle; thin patchy clay films; few fine roots; very strongly acid; gradual wavy boundary.

B't2—60 to 72 inches; red (2.5YR 4/8) sandy clay loam; common medium prominent brownish yellow (10YR 6/6) and light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; firm and slightly brittle; thin nearly continuous clay films; very strongly acid.

Thickness of the solum exceeds 60 inches. Reaction ranges from slightly acid to very strongly acid in the A and E horizons and ranges from very strongly acid to medium acid in the Bt and B/E horizons.

The A and E horizons have hue of 10YR, value of 4, 5, or 6, and chroma of 2, 3, or 4; or hue of 7.5YR, value of 4, 5, or 6, and chroma of 2 or 4.

The Bt, B't, and B/E horizons have hue of 5YR or 2.5YR, value of 4, 5, or 6, and chroma of 4, 6, or 8. The B't horizon has mottles in shades of gray, brown, red, or yellow. Texture is fine sandy loam, sandy clay loam, or clay loam. The clay content decreases from the Bt horizon to the B/E horizon but increases in the B't horizon. The E material in the B/E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture is fine sandy loam, loamy sand, or sandy loam. The E material is in streaks and pockets that make up as much as 50 percent of the horizon.

Sacul Series

The Sacul series consists of deep, moderately well drained, slowly permeable, nearly level to moderately sloping soils that formed in clayey marine sediment. These soils are on hilltops and side slopes. The water table is at a depth of 2 to 4 feet from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 1 to 12 percent.

Sacul soils are geographically associated with Angie, Bowie, Darco, Darden, Ora, Ruston, Smithdale, and Warnock soils. All of these associated soils are on similar landscapes. Angie soils have a yellower B horizon, and clay content does not decrease by 20 percent within a depth of 20 inches. Darco soils have a loamy control section and do not have a Bt horizon within a depth of 40 inches. Darden soils do not have a Bt horizon within a depth of 80 inches. Bowie soils have a fine-loamy control section, contain more than 5 percent plinthite, and do not have gray mottles within a depth of 30 inches. Ora soils have a fragipan and a fine-loamy control section. Ruston soils have a fine-loamy control section and a bisequal profile. Smithdale soils are on less dissected landscapes, have a fine-loamy control section, and do not have gray mottles within a depth of 30 inches. Warnock soils have a fine-loamy control section and do not have gray mottles within a depth of 30 inches.

Typical pedon of Sacul fine sandy loam, 3 to 8 percent slopes; in the SW1/4NE1/4NE1/4 sec. 23, T. 15 S., R. 20 W.

A—0 to 3 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.

E—3 to 7 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; clear smooth boundary.

Bt1—7 to 20 inches; red (2.5YR 4/6) clay; strong medium subangular blocky structure; firm; few fine roots; continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—20 to 30 inches; red (2.5YR 4/6) silty clay; common medium prominent light brownish gray (10YR 6/2) mottles; strong medium subangular blocky structure; firm; few fine roots; continuous clay film on faces of peds; very strongly acid; clear smooth boundary.

Bt3—30 to 43 inches; mottled red (2.5YR 4/6), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/6) silty clay; moderate medium subangular blocky structure; firm; continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

BC—43 to 54 inches; mottled light gray (10YR 7/2), red (2.5YR 4/6), and strong brown (7.5YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

C1—54 to 63 inches; light brownish gray (10YR 6/2) clay loam; common medium prominent red (2.5YR 4/8) mottles; thin platy structure; friable; very strongly acid; clear smooth boundary.

C2—63 to 80 inches; light brownish gray (10YR 6/2) sandy clay loam with streaks and strata of strong brown (7.5YR 5/8) sandy loam; massive; friable; very strongly acid.

Thickness of the solum ranges from 40 to more than 72 inches. Reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 3 or 4.

The Bt1 and Bt2 horizons have hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 4, 5, or 6. The Bt2 horizon has mottles in shades of gray. Texture is silty clay or clay. The Bt3 and BC horizons are mottled in shades of gray, brown, and red. These colors range from being about equal to either the red or gray being dominant. Texture of the Bt3 horizon is silty clay or clay. Texture of the BC horizon is silty clay loam, silt loam, or clay loam.

The C horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2, with mottles in shades of brown and red; or it is mottled in shades of red, gray, and brown. Texture is clay loam, sandy clay loam, or sandy loam. The C horizon is generally stratified.

Smithdale Series

The Smithdale series consists of deep, well drained, moderately permeable, gently sloping soils that formed in thick beds of loamy marine sediment. These soils are on gently sloping uplands. The native vegetation was mixed pines and hardwoods. Slopes range from 3 to 8 percent.

Smithdale soils are geographically associated with Bowie, Briley, Darco, Darden, Felker, Gore, Ora, Ruston, Sacul, and Warnock soils. All of these soils are on similar landscapes. Bowie soils contain more than 5 percent plinthite and have browner hue. Briley soils have sandy epipedons 20 to 40 inches thick. Darco soils have sandy epipedons 40 to 72 inches thick. Darden soils have a sandy control section and consist of uncoated quartz sand; sandy horizons extend to a depth of more than 80 inches. Felker soils have a fine-silty control section, have browner hue, and are somewhat poorly drained. Gore soils have a fine control section and more than 35 percent base saturation. Ora soils have a fragipan and are moderately well drained. Sacul soils have a clayey control section and gray mottles within a depth of 30 inches. Ruston soils have a bisequum. Warnock soils have browner hue in the Bt horizon.

Typical pedon of Smithdale fine sandy loam, 3 to 8 percent slopes; in the SE1/4NE1/4SW1/4 sec. 1, T. 18 S., R. 19 W.

Ap—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many medium and fine roots; medium acid; abrupt smooth boundary.

E—3 to 11 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; gradual wavy boundary.

Bt1—11 to 28 inches; red (2.5YR 4/8) sandy clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—28 to 40 inches; red (2.5YR 4/8) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; sand grains coated and bridged with clay; few fine mica flakes; very strongly acid; gradual wavy boundary.

Bt3—40 to 80 inches; red (2.5YR 4/6) sandy loam; weak medium subangular blocky structure; very friable; sand grains bridged and coated with clay; few pockets and streaks of uncoated sand grains; common fine mica flakes; very strongly acid.

Thickness of the solum ranges from 60 to 100 inches or more. Reaction is strongly acid or very strongly acid throughout, except for the surface layer in areas that have been limed.

The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The Ap or E horizons have hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4.

The upper part of the Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. Texture is clay loam, sandy clay loam, or loam. The lower part of the Bt horizon has colors similar to those of the upper part; it also has few to many pockets of uncoated sand grains. Texture is loam or sandy loam.

Smithton Series

The Smithton series consists of deep, poorly drained, moderately slowly permeable, level soils that formed in loamy marine sediment. These soils are on upland flats and stream terraces. The water table is at or near the surface from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 0 to 2 percent.

Smithton soils are geographically associated with Amy, Bibb, Guyton, and Harleston soils. Amy soils, which are on similar landscapes, have a fine-silty control section and slow permeability. Bibb soils, which are along narrow stream channels, have strata of different texture and have moderate permeability. Guyton soils, which are on adjacent flood plains, have a fine-silty control section and more than 35 percent base saturation. Harleston soils, which are in slightly higher upland positions, do not have dominant gray colors immediately below the A horizon and are moderately well drained.

Typical pedon of Smithton fine sandy loam, 0 to 2 percent slopes; in the SE1/4NE1/4SE1/4 sec. 28, T. 17 S., R. 20 W.

A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

Eg—6 to 13 inches; grayish brown (10YR 5/2) fine sandy loam; few fine distinct yellowish brown mottles; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

Btg1—13 to 27 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common thin clay films on faces of peds; few fine roots; very strongly acid, gradual smooth boundary.

Btg2—27 to 45 inches; light brownish gray (10YR 6/2) loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common thin clay films on faces of peds; few fine roots; very strongly acid; gradual smooth boundary.

Btg3—45 to 72 inches; gray (10YR 6/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; patchy clay films; very strongly acid.

Thickness of the solum is more than 60 inches. Reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 2. The Eg horizon has hue of 10YR, value of 5, and chroma of 1 or 2; or hue of 10YR, value of 6, and chroma of 2.

The Btg1 horizon has hue of 10YR, value of 6, and chroma of 1 or 2. The Btg2 and Btg3 horizons have hue of 10YR, value of 5 or 6, and chroma of 1; or hue of 10YR, value of 6, and chroma of 2. Mottles are common to many in shades of brown. Texture of the Btg1 and Btg2 horizons is loam or fine sandy loam. Texture of the Btg3 horizon is loam, fine sandy loam, or sandy clay loam.

Warnock Series

The Warnock series consists of deep, moderately well drained, moderately permeable, nearly level to gently sloping soils that formed in medium to moderately fine textured sediment of marine or fluvial origin. These soils are on hilltops and side slopes. The water table normally is at a depth of 4 to 6 feet from January through March. The natural vegetation was mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Warnock soils are geographically associated with Angie, Briley, Harleston, Ruston, Sacul, and Smithdale soils. All of these soils are on similar landscapes. Angie and Sacul soils have a clayey control section and gray mottles within a depth of 30 inches. Briley soils have a loamy control section and sandy epipedons 20 to 40 inches thick. Harleston soils have a coarse-loamy control section and mottles with chroma of 2 or less within a depth of 30 inches. All or part of the Bt horizon in Ruston and Smithdale soils has hue of 5YR or redder.

Typical pedon of Warnock fine sandy loam, 1 to 3 percent slopes; in the SE1/4NW1/4NW1/4 sec. 25, T. 16 S., R. 20 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many medium and coarse roots; very strongly acid; clear smooth boundary.

E—7 to 16 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak medium subangular blocky structure; very friable; few fine and medium roots; very strongly acid; clear smooth boundary.

Bt1—16 to 28 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; common patchy clay films on faces of peds; few fine and medium roots; 2 percent quartz pebbles by volume; extremely acid; gradual smooth boundary.

Bt2—28 to 34 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine and medium distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; common patchy clay films on faces of peds; few fine and medium roots; 2 percent quartz pebbles by volume; extremely acid; gradual wavy boundary.

Bt3—34 to 42 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct light brownish gray (10YR 6/2), common medium prominent red (2.5YR 4/6), and few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous thin clay films on faces of peds; few fine and medium roots; 5 percent quartz pebbles by volume; firm and slightly brittle in about 10 to 15 percent of mass; about 3 percent plinthite; extremely acid; gradual wavy boundary.

Btx—42 to 58 inches; mottled red (2.5YR 4/6), light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; continuous thin clay films on faces of peds; few fine and medium roots; about 5 percent quartz pebbles by volume; slightly brittle in about 35 percent of mass; about 4 percent plinthite; extremely acid; gradual wavy boundary.

Btgx—58 to 72 inches; gray (10YR 6/1) sandy clay loam; common medium and coarse prominent red (2.5YR 4/6), common medium prominent red (10R 4/6), few coarse prominent yellowish red (5YR 5/6), and few medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; thick continuous clay films on faces of peds; few fine and medium roots; 10 percent quartz pebbles by volume; slightly brittle in about 35 percent of mass; about 2 percent plinthite; very strongly acid.

Thickness of the solum is more than 60 inches. Reaction is strongly acid to extremely acid throughout.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2, 3, or 4.

The Bt1 and Bt2 horizons have hue of 10YR, value of 5, and chroma of 4, 6, or 8; hue of 10YR, value of 6, and chroma of 6 or 8; hue of 7.5YR, value of 5, and chroma of 6 or 8; or hue of 7.5YR, value of 6, and chroma of 8. Mottles are in shades of red and brown. The Bt3 and Btx horizons have hue of 10YR, value of 5, and chroma of 4, 6, or 8; hue of 10YR, value of 6, and chroma of 6 or 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8, with mottles in shades of red, brown, or gray; or they are mottled in shades of red, brown, and gray. Brittleness of the Btx horizon ranges from 10 to 35 percent of the mass. These horizons are loam, sandy clay loam, or clay loam. The Btgx horizon has hue of 2.5Y, value of 5 or 6, and chroma of 2; or hue of 10YR, value of 5 or 6, and chroma of 1 or 2, with mottles in shades of brown and red; or it is mottled in shades of gray, brown, and red. Texture is loam, sandy clay loam, clay loam, clay, or, rarely, fine sandy loam. Plinthite content is 0 to 5 percent. Brittleness ranges from 10 to 35 percent of the mass.

Wrightsville Series

The Wrightsville series consists of deep, poorly drained, very slowly permeable, level soils that formed in old silty and clayey alluvium. These soils are on broad upland flats. The water table is at a depth of 6 to 18 inches from January through April. The native vegetation was mixed pines and hardwoods. Slopes range from 0 to 1 percent.

Wrightsville soils are geographically associated with Adaton, Blevins, Felker, Louin, and Muskogee soils. None of these associated soils have tongues of E material extending into the B horizon. Adaton and Louin soils are on landscapes similar to those of the Wrightsville soils. Blevins, Felker, and Muskogee soils are in slightly higher positions. Adaton soils have a fine-silty control section. Blevins soils have a fine-silty control section, siliceous mineralogy, brown matrix colors, and are well drained. Felker soils have a fine-silty control section, less than 35 percent base saturation, and are somewhat poorly drained. Louin soils have montmorillonitic mineralogy. Muskogee soils have a fine-silty control section.

Typical pedon of Wrightsville silty clay loam, 0 to 1 percent slopes; in the NW1/4SE1/4NW1/4 sec. 3, T. 19 S., R. 23 W.

A—0 to 4 inches; grayish brown (10YR 5/2) silty clay loam; few fine faint gray mottles; weak fine granular structure; friable; many common and fine roots; extremely acid; abrupt smooth boundary.

Eg—4 to 17 inches; light gray (10YR 7/1) silty clay loam; common medium distinct brownish yellow (10YR

6/6) and reddish brown (5YR 4/4) mottles; weak medium subangular blocky structure; friable; common medium and fine pores; very strongly acid; abrupt irregular boundary.

B/E—17 to 24 inches; gray (10YR 6/1) silty clay; 15 percent tongues 1/2 to 1 inch wide of light gray (10YR 7/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; silty clay has moderate medium subangular blocky structure; firm; silty clay loam is massive; friable; common medium and fine roots; common fine pores; clay films continuous on faces of peds and in pores of silty clay loam; very strongly acid; gradual irregular boundary.

Btg1—24 to 37 inches; gray (10YR 6/1) silty clay; common medium distinct yellowish brown (10YR 5/6) and common fine distinct strong brown mottles; moderate medium subangular blocky structure; firm; common fine and few medium roots; few fine pores; clay films continuous on faces of peds and in pores; very strongly acid; clear wavy boundary.

Btg2—37 to 46 inches; grayish brown (10YR 5/2) silty clay, common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; clay films continuous on faces of peds very strongly acid; gradual smooth boundary.

Btg3—46 to 56 inches; light brownish gray (10YR 6/2) silty clay; common medium prominent yellowish red (5YR 4/6) and common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; very firm; few fine roots; clay films continuous on faces of peds; very strongly acid; gradual smooth boundary.

Btg4—56 to 70 inches; light gray (2.5Y 7/2) silty clay; common fine prominent yellowish red and common fine faint pale brown mottles; moderate medium subangular blocky structure; very firm; few fine roots; clay films continuous on faces of peds; very strongly acid; clear wavy boundary.

BC—70 to 80 inches; yellowish red (5YR 5/6) silty clay; common medium prominent light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; very firm; few patchy clay films on faces of peds; few small black concretions; common black veins on faces of peds; slightly acid.

Thickness of the solum ranges from 40 to 72 inches or more. Reaction ranges from extremely acid to strongly acid in the A and E horizons, extremely acid to medium acid in the upper part of the Btg horizon, and extremely acid to moderately alkaline in the lower part of the Btg, BC and C horizons.

The A horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 2. The Eg horizon has hue of 10YR, value of 5, 6, or 7, and chroma of 1 or 2; or hue of 2.5Y, value of 6 or 7, and chroma of 2.

The B/E horizon has hue of 10YR, value of 5, 6, or 7, and chroma of 1 or 2; or hue of 2.5Y, value of 6 or 7, and chroma of 2. Mottles are in shades of brown and yellow. Tongues of silt loam or silty clay loam extend into or through the B/E horizon and are 1/2 to 1 inch wide. Texture is silty clay loam, clay, or silty clay. The Btg horizon has the same colors as the B/E horizon with mottles in shades of brown, yellow, and red. Texture is silty clay loam or silty clay. The BC horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. Mottles are in shades of gray and brown. Texture is silty clay loam or silty clay.

Some pedons have a 2B or 2C horizon that is neutral to moderately alkaline, reddish clay or silty clay.

Formation of the Soils

This section describes the factors of soil formation as they relate to the soils in the county and explains the processes involved in soil formation.

Factors of Soil Formation

Soil is the collection of three-dimensional natural bodies on the earth's surface. Soil supports plants and has properties resulting from the integrated effect of climate and living matter acting on parent material, as conditioned by relief, over time *(5)*.

The interaction of five main factors results in differences between soils. These factors are the physical and chemical composition of the parent material, the climate during and after the accumulation of the parent material, the kinds of plants and organisms living in the soils, the relief of the land and its effect on runoff, and the length of time it took the soil to form.

The influence of any factor can vary from place to place, but the interaction of all factors determines the kind of soil that forms. In the following paragraphs the factors of soil formation are discussed as they relate to the soils in the survey area.

Parent Material

The soils of Columbia County formed in two broad classes of parent material: alluvium deposited by major streams, and Coastal Plain sediment deposited when the Gulf of Mexico covered southern and eastern Arkansas.

West of Bayou Dorcheat, the parent material is mostly alluvium deposited by the Red River, but it contains a mixture of Coastal Plain sediment. The Red River alluvium came mainly from the Permian red beds in western Texas and Oklahoma. Here, such soils as Adaton, Blevins, Felker, Gore, Louin, Muskogee, and Wrightsville soils formed.

East of Bayou Dorcheat, the parent material is Coastal Plain sediment. This sediment is mainly loamy and clayey. Here, such soils as Angie, Bowie, Briley, Darco, Darden, Harleston, Ruston, Sacul, Smithdale, Smithton, and Warnock soils formed.

Climate

The climate of Columbia County is characterized by relatively short, cool winters and long, hot summers with adequate rainfall. The present climate probably is similar to the climate under which the soils formed. The average daily maximum temperature is about 92 degrees during the summer and about 46 degrees during the winter. Average annual rainfall is about 50 inches and is generally well distributed throughout the year. For additional information about the climate, refer to the section 'General Nature of the County."

The warm, moist climate of this area promotes rapid soil formation and encourages rapid chemical reactions. The large amount of water that moves through the soil is instrumental in moving dissolved or suspended materials downward in the soil profile. Plant remains decompose rapidly, and the organic acid that forms hastens the removal of carbonates and the formation of clay. Because only the upper few inches of the soil is frozen for a relatively short period, soil formation continues almost the year round. The climate throughout the survey area is relatively uniform, but its effect is modified locally by elevation and slope aspect. Climate alone does not account for differences in the soils in the survey area.

Living Organisms

The higher forms of plants and animals, as well as insects, bacteria, and fungi, are important in the formation of soils. Among the changes they cause are gains in organic matter and nitrogen in the soil, gains or losses in plant nutrients, and changes in structure and porosity.

Before Columbia County was settled, the native vegetation probably had more influence on soil formation than did animal activity. Hardwood and pine forests covered the county. Differences in native vegetation were probably related mainly to variations in drainage and, to a lesser degree, parent material. Because the type of vegetation is relatively uniform throughout the county, differences among the soils cannot be directly related to vegetation.

Man is important to the present and future rate and direction of soil formation. Man clears the forest, cultivates the soil, and introduces new kinds of plants. Man adds fertilizer, lime, and chemicals to the soil for insect, disease, and weed control. Levees and dams for flood control, improved drainage, and grading the soil surface also affect the development of soils. The results of these changes may not be evident for many centuries. However, man has drastically changed the complex of living organisms affecting soil formation in Columbia County.

Relief

Relief is the inequalities in elevation of a land surface. Relief affects the other soil forming factors through its effects on drainage, runoff, erosion, and percolation of water through the soil. Some of the greatest differences among the soils are due mainly to differences in relief.

Time

The length of time required for formation of soil depends mainly on the other factors of soil formation. Less time generally is required if the climate is warm and humid, the vegetation is luxuriant, and the parent material is loamy. Older soils generally show a greater degree of differentiation between horizons.

The soils of the uplands generally have the most strongly developed argillic horizons and are the most mature soils in Columbia County. Soils on the flood plains consist of younger material and are much less mature than most soils on the uplands. Among these are Bibb and Guyton soils.

Processes of Soil Formation

The effects of the soil-forming factors are reflected in the soil profile. The soil profile is a succession of layers, or horizons, from the surface downward and includes at least the upper portion of the parent material. The parent material has been little altered by soil-forming processes. The horizons differ in one or more properties, such as color, texture, structure, consistence, porosity, or reaction.

Most soil profiles in this county contain three to five major horizons, or layers. The major horizons are designated A, E, B, and C. Young soils commonly do not have E and B horizons.

The horizon of maximum accumulation of humified organic matter is called the A horizon, or the surface layer. The horizon of maximum leaching of dissolved or suspended material is called the E horizon, or the subsurface layer.

The B horizon lies immediately below the E horizon and is sometimes called the subsoil *(10)*. It is the horizon of maximum accumulation of dissolved or suspended material, such as iron and silicate clay. Commonly, the B horizon has blocky structure and is firmer than the horizons immediately above or below it.

The C horizon or layer lies below the B horizon. Typically, it has been little affected by the soil-forming processes, although in places it is materially modified by weathering. In some young soils, the C horizon has been only slightly modified by living organisms and by weathering, and it immediately underlies the A horizon.

Several processes have been active in the formation of soil horizons in the county. Among these processes are the accumulation of organic matter, the leaching of carbonates and bases, the oxidation or reduction and transfer of iron, and the formation and translocation of silicate clay minerals. In most of the soils, more than one of these processes was involved.

The accumulation of organic matter in the upper part of the profile to form an A horizon has been an important process in soil formation. The soils of Columbia County range from low to moderate in organic matter content.

Leaching of carbonates and bases has occurred to some degree in nearly all of the soils in the county. Generally, bases are leached downward in soils before silicate clay minerals begin to move. Most of the upland soils have been strongly leached.

Oxidation of iron is evident in moderately well drained and well drained soils. Red or brown colors in the B horizon are an indication of the oxidation of iron in the B horizon of such soils as Bowie, Sacul, Smithdale, and Warnock soils.

Reduction and transfer of iron has occurred, to a significant extent, in the somewhat poorly drained and poorly drained soils. In the naturally wet soils, this process is called gleying. Gray colors in the horizons below the surface layer indicate the reduction and loss of iron. Some horizons contain reddish or yellowish mottles and concretions derived from segregated iron. Gleying is very pronounced in the Amy, Guyton, and Wrightsville soils.

The translocation of silicate clay minerals has contributed to horizon development in most of the soils in Columbia County. In areas where the soils have been cultivated, most of the eluviated E horizon has been destroyed. Where it remains, however, the E horizon has weak granular to blocky or platy structure, has less clay than the underlying horizons, and is lighter colored than the rest of the soil. Clay films generally have accumulated in pores and on the surface of peds in the B horizon. The soils were probably leached of carbonates and soluble salts to a great extent before the translocation of silicate clay occurred.

In Columbia County, leaching of bases and translocation of silicate clay are among important processes of horizon differentiation in the soils.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). The volume of soft soil decreases excessively under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragile (in tables). The soil is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse-textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). There is a shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). The soil mass is susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited in stream valleys by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors that are assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of course grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Based on data recorded in the period 1951-80 at Magnolia, Arkansas]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	55.2	32.8	44.0	78	9	71	4.15	2.19	5.86	7	1.1
February---	60.7	35.5	48.1	81	14	103	4.07	2.34	5.61	6	.5
March------	68.0	42.4	55.2	86	20	230	4.71	2.57	6.59	8	.1
April------	76.7	51.1	63.9	88	29	417	5.59	2.43	8.27	7	.0
May--------	83.1	58.5	70.8	93	40	645	4.75	2.42	6.77	7	.0
June-------	89.5	65.5	77.5	99	50	825	3.71	1.64	5.48	5	.0
July-------	93.3	68.7	81.0	102	57	961	4.04	1.67	6.04	6	.0
August-----	92.9	67.4	80.2	103	54	936	3.46	1.34	5.22	5	.0
September--	86.8	62.0	74.4	99	42	732	3.70	1.26	5.71	5	.0
October----	77.9	50.2	64.1	93	30	437	2.89	.93	4.50	4	.0
November---	66.1	40.3	53.2	83	17	137	4.47	2.30	6.36	6	.0
December---	58.0	35.1	46.6	79	13	61	4.73	2.30	6.84	7	.6
Yearly:											
Average--	75.7	50.8	63.3	---	---	---	---	---	---	---	---
Extreme--	---	---	---	105	7	---	---	---	---	---	---
Total----	---	---	---	---	---	5,555	50.27	40.82	59.38	73	2.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Based on data recorded in the period 1951-80 at Magnolia, Arkansas]

Probability	Temperature 24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 23	April 3	April 13
2 years in 10 later than--	March 14	March 28	April 8
5 years in 10 later than--	February 25	March 16	March 30
First freezing temperature in fall:			
1 year in 10 earlier than--	November 6	October 28	October 16
2 years in 10 earlier than--	November 12	November 1	October 21
5 years in 10 earlier than--	November 24	November 9	October 30

TABLE 3.--GROWING SEASON

[Based on data recorded in the period 1951-80 at Magnolia, Arkansas]

Probability	Daily minimum temperature during growing season: Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	242	219	199
8 years in 10	252	225	204
5 years in 10	271	237	213
2 years in 10	290	249	222
1 year in 10	300	256	227

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Adaton-Felker association, 0 to 2 percent slopes	16,720	3.4
2	Amy silt loam, 0 to 1 percent slopes	8,420	1.7
3	Angie fine sandy loam, 1 to 3 percent slopes	9,440	1.9
4	Angie fine sandy loam, 3 to 8 percent slopes	18,940	3.9
5	Bibb fine sandy loam, frequently flooded	18,840	3.8
6	Blevins silt loam, 1 to 3 percent slopes	1,690	0.3
7	Blevins silt loam, 3 to 8 percent slopes	785	0.2
8	Bowie fine sandy loam, 1 to 3 percent slopes	26,500	5.4
9	Bowie fine sandy loam, 3 to 8 percent slopes	63,455	12.9
10	Briley loamy fine sand, 1 to 3 percent slopes	1,655	0.3
11	Briley loamy fine sand, 3 to 8 percent slopes	8,620	1.8
12	Darden-Darco loamy fine sands, 2 to 8 percent slopes	2,895	0.6
13	Felker silt loam, 0 to 2 percent slopes	8,240	1.7
14	Gore silt loam, 1 to 3 percent slopes	725	0.1
15	Gore silt loam, 3 to 8 percent slopes	1,510	0.3
16	Guyton silt loam, frequently flooded	76,350	15.6
17	Harleston very fine sandy loam, 1 to 3 percent slopes	41,394	8.4
18	Harleston very fine sandy loam, 3 to 8 percent slopes	16,660	3.4
19	Louin silty clay loam, 0 to 1 percent slopes	1,830	0.4
20	Muskogee silt loam, 1 to 3 percent slopes	3,485	0.7
21	Oil-waste land	585	0.1
22	Ora fine sandy loam, 3 to 8 percent slopes	3,100	0.6
23	Ruston fine sandy loam, 1 to 3 percent slopes	6,200	1.3
24	Sacul fine sandy loam, 1 to 3 percent slopes	5,850	1.2
25	Sacul fine sandy loam, 3 to 8 percent slopes	77,575	15.8
26	Sacul fine sandy loam, 8 to 12 percent slopes	8,660	1.8
27	Smithdale fine sandy loam, 3 to 8 percent slopes	23,170	4.7
28	Smithton fine sandy loam, 0 to 2 percent slopes	15,790	3.2
29	Warnock fine sandy loam, 1 to 3 percent slopes	2,400	0.5
30	Warnock fine sandy loam, 3 to 8 percent slopes	15,460	3.2
31	Wrightsville silty clay loam, 0 to 1 percent slopes	4,000	0.8
	Total	490,944	100.0

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Common bermudagrass	Improved bermudagrass	Tall fescue	Bahiagrass
		AUM*	AUM*	AUM*	AUM*
1**:					
Adaton	IIIw	7.0	8.0	6.0	7.0
Felker	IIw	5.0	7.0	5.5	6.0
2 Amy	IIIw	6.0	7.0	6.0	7.0
3 Angie	IIe	5.5	9.0	---	7.5
4 Angie	IIIe	5.5	9.0	---	7.0
5 Bibb	Vw	6.0	8.0	7.0	7.0
6 Blevins	IIe	6.5	8.0	---	7.5
7 Blevins	IIIe	6.5	8.0	---	7.5
8 Bowie	IIe	7.0	10.0	---	7.5
9 Bowie	IIIe	6.5	10.0	---	7.0
10 Briley	IIIs	6.0	9.0	---	6.0
11 Briley	IIIe	6.0	8.0	---	5.0
12 Darden-Darco	IVs	5.0	7.0	---	5.0
13 Felker	IIw	5.0	7.0	5.5	6.0
14 Gore	IIIe	4.5	6.0	---	6.5
15 Gore	IVe	4.0	5.5	---	6.0
16 Guyton	Vw	4.5	5.5	4.5	5.0
17 Harleston	IIw	7.0	9.5	---	8.5
18 Harleston	IIIe	7.0	9.0	---	8.0
19 Louin	IIIw	6.0	8.0	7.0	7.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Common bermudagrass	Improved bermudagrass	Tall fescue	Bahiagrass
		AUM*	AUM*	AUM*	AUM*
20----------------------- Muskogee	IIe	7.0	10,0	6.5	7.5
21**--------------------- Oil-waste land	VIIIs	---	---	---	---
22----------------------- Ora	IIIe	7.0	8.5	---	8.0
23----------------------- Ruston	IIe	7.0	10.0	---	8.0
24----------------------- Sacul	IIIe	5.0	9.0	---	7.5
25----------------------- Sacul	IVe	5.0	9.0	---	7.0
26----------------------- Sacul	VIe	4.0	7-0	---	6.5
27----------------------- Smithdale	IIIe	6.5	9.0	---	8.0
28----------------------- Smithton	IIIw	7.0	8.0	6.0	7.5
29----------------------- Warnock	IIe	7.0	9.0	---	8.0
30----------------------- Warnock	IIIe	6.5	8.0	---	7.0
31----------------------- Wrightsville	IIIw	7.0	9.0	7.0	7.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Woodland suitability group	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees*	Site index
		Management concerns					Potential productivity	
1**:								
Adaton	2w9	Slight	Severe	Moderate	Moderate	Severe	Loblolly pine	86
							Water oak	80
							Sweetgum	80
Felker	2w8	Slight	Moderate	Moderate	Moderate	Moderate	Loblolly pine	90
							Sweetgum	95
							Shortleaf pine	75
							Water oak	85
2 Amy	2w9	Slight	Severe	Moderate	Moderate	Severe	Loblolly pine	90
							Shortleaf pine	80
							Sweetgum	90
3, 4 Angie	2o7	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	91
							Shortleaf pine	83
							Sweetgum	80
5 Bibb	2w9	Slight	Severe	Severe	Moderate	Severe	Loblolly pine	90
							Sweetgum	90
							Water oak	90
6, 7 Blevins	2o7	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	90
							Shortleaf pine	80
							Sweetgum	90
							White oak	---
8, 9 Bowie	3o7	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	83
							Shortleaf pine	80
10, 11 Briley	3s2	Slight	Slight	Moderate	Slight	Moderate	Loblolly pine	82
							Shortleaf pine	70
12**:								
Darden	3s3	Slight	Moderate	Severe	Slight	Moderate	Loblolly pine	80
							Shortleaf pine	70
Darco	3s3	Slight	Moderate	Severe	Slight	Moderate	Loblolly pine	80
							Shortleaf pine	68
13 Felker	2w8	Slight	Moderate	Moderate	Moderate	Moderate	Loblolly pine	90
							Sweetgum	95
							Shortleaf pine	75
							Water oak	85
14, 15 Gore	3c2	Slight	Moderate	Moderate	Slight	Moderate	Loblolly pine	76
							Shortleaf pine	---
16 Guyton	2w9	Slight	Severe	Moderate	Moderate	Severe	Loblolly pine	90
							Sweetgum	---
							Water oak	---

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Woodland suitability group	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees*	Site index
17, 18 Harleston	2w8	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine	90
							Shortleaf pine	80
							Sweetgum	80
19 Louin	3w9	Slight	Severe	Moderate	Moderate	Severe	Loblolly pine	85
							Shortleaf pine	75
							Sweetgum	80
20 Muskogee	3o7	Slight	Slight	Slight	Moderate	Moderate	Loblolly pine	80
							Shortleaf pine	70
							Sweetgum	80
							Water oak	---
22 Ora	3o7	Slight	Slight	Slight	Moderate	Moderate	Loblolly pine	83
							Shortleaf pine	69
							Sweetgum	80
23 Ruston	3o1	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	84
							Shortleaf pine	75
24, 25, 26 Sacul	3c2	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine	85
							Shortleaf pine	75
27 Smithdale	3o1	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	80
							Shortleaf pine	69
28 Smithton	2w9	Slight	Severe	Moderate	Moderate	Severe	Loblolly pine	90
							Shortleaf pine	80
							Sweetgum	90
							Cherrybark oak	90
							Water oak	90
29, 30 Warnock	3o1	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	84
							Shortleaf pine	75
31 Wrightsville	3w9	Slight	Severe	Moderate	Moderate	Severe	Loblolly pine	80
							Sweetgum	80
							Water oak	80

* Loblolly pine is the indicator for site index data.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
1*:				
Adaton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Felker	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.
2 Amy	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3, 4 Angie	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
5 Bibb	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
6, 7 Blevins	Slight	Slight	Moderate: slope.	Slight.
8, 9 Bowie	Slight	Slight	Moderate: slope.	Slight.
10, 11 Briley	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
12*:				
Darden	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
Darco	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
13 Felker	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight.
14, 15 Gore	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
16 Guyton	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
17, 18 Harleston	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight.
19 Louin	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
20 Muskogee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
21*. Oil-waste land				
22 Ora	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight.
23 Ruston	Slight	Slight	Moderate: slope.	Slight.
24, 25 Sacul	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
26 Sacul	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
27 Smithdale	Slight	Slight	Moderate: slope.	Slight.
28 Smithton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
29, 30 Warnock	Slight	Slight	Moderate: slope.	Slight.
31 Wrightsville	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the map unit was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1*:										
Adaton	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Felker	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
2 Amy	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Good	Good.
3 Angie	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
4 Angie	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
5 Bibb	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
6 Blevins	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
7 Blevins	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
8 Bowie	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
9 Bowie	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
10 Briley	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Poor.
11 Briley	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
12*:										
Darden	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Darco	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
13 Felker	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
14 Gore	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
15 Gore	Poor	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
16 Guyton	Poor	Fair	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
17 Harleston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
18----------------- Harleston	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
19----------------- Louin	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
20----------------- Muskogee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
21*. Oil-waste land										
22----------------- Ora	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
23----------------- Ruston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
24----------------- Sacul	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
25, 26------------- Sacul	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27----------------- Smithdale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
28----------------- Smithton	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
29----------------- Warnock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30----------------- Warnock	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
31----------------- Wrightsville	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1*:					
Adaton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Felker	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: low strength, wetness, shrink-swell.
2 Amy	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.
3, 4 Angie	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
5 Bibb	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.
6 Blevins	Slight	Slight	Slight	Slight	Severe: low strength.
7 Blevins	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.
8 Bowie	Slight	Slight	Slight	Slight	Slight.
9 Bowie	Slight	Slight	Slight	Moderate: slope.	Slight.
10 Briley	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
11 Briley	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
12*:					
Darden	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Darco	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
13 Felker	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: low strength, wetness, shrink-swell.
14, 15 Gore	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
16---------------- Guyton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.
17---------------- Harleston	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
18---------------- Harleston	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.
19---------------- Louin	Severe: cutbanks cave, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.
20---------------- Muskogee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.
21*. Oil-waste land					
22---------------- Ora	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.
23---------------- Ruston	Slight-----------	Slight-----------	Slight-----------	Slight------------	Moderate: low strength.
24, 25------------ Sacul	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
26---------------- Sacul	Moderate: too clayey, slope, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
27---------------- Smithdale	Slight-----------	Slight-----------	Slight-----------	Moderate: slope.	Slight.
28---------------- Smithton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
29---------------- Warnock	Moderate: wetness.	Slight-----------	Moderate: wetness.	Slight------------	Moderate: low strength.
30---------------- Warnock	Moderate: wetness.	Slight-----------	Moderate: wetness.	Moderate: slope.	Moderate: low strength.
31---------------- Wrightsville	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*:					
Adaton	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey, hard to pack.
Felker	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
2 Amy	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
3, 4 Angie	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
5 Bibb	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
6, 7 Blevins	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
8, 9 Bowie	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
10, 11 Briley	Slight	Moderate: seepage, slope.	Slight	Severe: seepage.	Good.
12*:					
Darden	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
Darco	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Fair: too sandy.
13 Felker	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
14, 15 Gore	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
16 Guyton	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
17, 18 Harleston	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
19 Louin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
20 Muskogee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
21*. Oil-waste land					
22 Ora	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
23 Ruston	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
24, 25 Sacul	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
26 Sacul	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey, hard to pack.
27 Smithdale	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
28 Smithton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
29, 30 Warnock	Moderate: wetness, percs slowly.	Severe: seepage.	Slight	Severe: seepage.	Fair: too clayey.
31 Wrightsville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," "improbable," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1*:				
Adaton	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
Felker	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
2 Amy	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3, 4 Angie	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
5 Bibb	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
6, 7 Blevins	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
8, 9 Bowie	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
10, 11 Briley	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
12*:				
Darden	Good	Probable	Improbable: too sandy.	Fair: too sandy.
Darco	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
13 Felker	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
14, 15 Gore	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
16 Guyton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
17, 18 Harleston	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
19-------------------- Louin	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
20-------------------- Muskogee	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
21*. Oil-waste land				
22-------------------- Ora	Fair: low strength, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
23-------------------- Ruston	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
24, 25, 26------------ Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
27-------------------- Smithdale	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
28-------------------- Smithton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
29, 30---------------- Warnock	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
31-------------------- Wrightsville	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*:						
Adaton	Slight	Severe: wetness.	Percs slowly	Wetness, percs slowly.	Percs slowly, wetness.	Wetness, percs slowly.
Felker	Slight	Severe: piping.	Favorable	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
2 Amy	Moderate: seepage.	Severe: wetness.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
3 Angie	Slight	Moderate: hard to pack, wetness.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
4 Angie	Moderate: slope.	Moderate: hard to pack, wetness.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
5 Bibb	Moderate: seepage.	Severe: piping, wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
6 Blevins	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
7 Blevins	Moderate: seepage.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
8 Bowie	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
9 Bowie	Moderate: seepage.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
10 Briley	Moderate: seepage.	Moderate: piping.	Deep to water	Droughty, fast intake.	Favorable	Droughty.
11 Briley	Moderate: seepage.	Moderate: piping.	Deep to water	Droughty, fast intake, slope.	Favorable	Droughty.
12*:						
Darden	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Favorable	Droughty.
Darco	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Favorable	Droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
13 Felker	Slight	Severe: piping.	Favorable	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
14 Gore	Slight	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, rooting depth.	Erodes easily, percs slowly.	Erodes easily, rooting depth.
15 Gore	Moderate: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, rooting depth, slope.	Erodes easily, percs slowly.	Erodes easily, rooting depth.
16 Guyton	Moderate: seepage.	Severe: piping, wetness.	Percs slowly, flooding.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
17 Harleston	Moderate: seepage.	Severe: piping.	Favorable	Wetness	Wetness	Favorable.
18 Harleston	Moderate: seepage.	Severe: piping.	Slope	Wetness, slope.	Wetness	Favorable.
19 Louin	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
20 Muskogee	Slight	Moderate: hard to pack, wetness.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
21*. Oil-waste land						
22 Ora	Moderate: seepage.	Moderate: piping, wetness.	Slope	Wetness, droughty, rooting depth.	Erodes easily, wetness.	Erodes easily, droughty.
23 Ruston	Moderate: seepage.	Severe: thin layer.	Deep to water	Favorable	Favorable	Favorable.
24 Sacul	Slight	Severe: hard to pack.	Deep to water	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly.
25 Sacul	Slight	Severe: hard to pack.	Deep to water	Slope, percs slowly, wetness.	Percs slowly, wetness.	Percs slowly.
26 Sacul	Slight	Severe: hard to pack.	Deep to water	Slope, percs slowly, wetness.	Slope, percs slowly, wetness.	Slope, percs slowly.
27 Smithdale	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
28 Smithton	Slight	Severe: piping, wetness.	Favorable	Wetness	Wetness	Wetness.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
29----------------- Warnock	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.
30----------------- Warnock	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.
31----------------- Wrightsville	Slight---------	Severe: wetness.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified Classifications and USDA textures in addition to those show. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*:											
Adaton----------	0-5	Silt loam--------	ML, CL, CL-ML	A-4	0	100	98-100	90-100	84-100	<30	NP-10
	5-72	Silt loam, silty clay loam, silty clay.	CL, CH	A-6, A-7	0	100	98-100	95-100	84-100	30-52	11-30
Felker----------	0-7	Silt loam--------	CL, ML, CL-ML	A-4	0	100	100	94-100	55-85	<30	NP-10
	7-74	Silt loam, clay loam, silty clay loam.	CL, ML	A-4, A-6	0	100	100	90-100	60-90	26-39	7-18
2---------------- Amy	0-8	Silt loam--------	ML	A-4	0	100	95-100	90-100	70-95	<30	NP-5
	8-58	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	95-100	95-100	85-95	25-40	8-20
	58-72	Fine sandy loam, silt loam, silty clay loam.	ML, SM, CL-ML, CL	A-4, A-6	0	100	95-100	80-95	40-90	<35	NP-20
3, 4------------- Angie	0-13	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4, A-2	0	95-100	90-100	60-85	30-55	<28	NP-10
	13-72	Silty clay loam, silty clay, clay.	CH, CL	A-7	0	95-100	90-100	85-100	75-95	41-55	18-29
5---------------- Bibb	0-12	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0-5	95-100	90-100	60-90	30-60	<25	NP-7
	12-72	Fine sandy loam, silt loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	40-100	30-90	<30	NP-7
6, 7------------- Blevins	0-9	Silt loam--------	ML, CL-ML	A-4	0	100	95-100	85-95	60-85	<25	NP-7
	9-50	Loam, silt loam, silty clay loam.	CL	A-6, A-4	0	100	95-100	90-100	85-95	25-35	8-15
	50-65	Silt loam, loam	ML, CL-ML	A-4	0	100	95-100	85-95	75-95	<25	NP-7
	65-72	Silt loam, silty clay loam, clay loam.	CL	A-6, A-4	0	100	95-100	95-100	85-95	25-35	8-15
8, 9------------- Bowie	0-10	Fine sandy loam	SM, SM-SC, ML	A-2, A-4	0	98-100	98-100	95-100	30-55	<25	NP-6
	10-30	Sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	90-100	90-100	85-100	40-72	20-40	8-25
	30-72	Sandy clay loam, clay loam.	SC, CL	A-4, A-6, A-7	0	80-100	70-100	65-100	36-77	20-48	8-30
10, 11----------- Briley	0-22	Loamy fine sand	SM	A-2,-A-4	0	97-100	95-100	80-100	17-45	<20	NP-3
	22-72	Fine sandy loam, sandy clay loam, loam.	SC, CL	A-4, A-6	0	95-100	95-100	85-100	36-65	22-39	8-22
12*:											
Darden----------	0-6	Loamy fine sand	SM, SP-SM	A-2, A-3	0	100	100	90-100	5-35	<20	NP-3
	6-82	Loamy fine sand, sand, loamy sand.	SM, SP-SM	A-2	0	100	100	90-100	11-35	<20	NP-3

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
12*:											
Darco	0-42	Loamy fine sand	SM	A-2	0-5	95-100	95-100	60-90	15-30	<30	NP-4
	42-63	Sandy clay loam	SC, CL	A-6,	0	100	95-100	80-95	36-55	30-40	15-25
	63-80	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	100	95-100	75-90	25-50	20-40	5-18
13 Felker	0-7	Silt loam	CL, ML, CL-ML	A-4	0	100	100	94-100	55-85	<30	NP-10
	7-74	Silt loam, clay, loam, silty clay loam.	CL, ML	A-4, A-6	0	100	100	90-100	60-90	26-39	7-18
14, 15 Gore	0-5	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	60-90	<27	NP-7
	5-45	Clay, silty clay	CH	A-7	0	100	100	95-100	85-100	53-65	28-40
	45-72	Clay, silty clay.	CH	A-7	0	100	100	95-100	85-100	51-83	25-53
16 Guyton	0-14	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	14-55	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-18
	55-72	Silt loam, silty clay loam, sandy clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	50-95	<40	NP-18
17, 18 Harleston	0-9	Very fine sandy loam.	ML, SM, CL-ML, SM-SC	A-2, A-4	0	90-100	90-100	60-85	30-55	<25	NP-7
	9-34	Sandy loam, loam, very fine sandy loam.	SC, CL, CL-ML, SM-SC	A-2, A-4	0	90-100	85-100	60-95	30-70	20-30	5-10
	34-72	Sandy loam, loam, sandy clay loam.	SC, CL, CL-ML, SM-SC	A-2, A-4, A-6	0	90-100	85-100	60-95	30-70	20-35	5-13
19 Louin	0-5	Silty clay loam	CL	A-6,	0	100	100	90-100	70-95	30-40	15-28
	5-70	Silty clay, clay	CH	A-7	0	100	100	90-100	85-95	55-75	32-50
20 Muskogee	0-4	Silt loam	ML, CL, CL-ML	A-4	0	100	100	95-100	85-100	18-30	1-10
	4-28	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	90-100	35-55	15-30
	28-78	Silty clay, clay	CH	A-7	0	100	100	95-100	90-100	55-70	30-40
21*. Oil-waste land											
22 Ora	0-11	Fine sandy loam	SM-SC, SM, ML, CL-ML	A-4, A-2	0	100	95-100	65-85	30-65	<30	NP-5
	11-19	Clay loam, sandy clay loam, loam.	CL	A-6, A-4, A-7	0	100	95-100	80-100	50-80	25-48	8-22
	19-55	Sandy clay loam, loam, sandy loam.	CL	A-6, A-7, A-4	0	100	95-100	80-100	50-75	25-43	8-25
	55-72	Sandy clay loam, loam, sandy loam.	CL	A-6, A-7	0	100	95-100	80-98	50-60	30-49	11-30

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
23--------------- Ruston	0-12	Fine sandy loam	SM, ML	A-4, A-2	0	85-100	78-100	65-100	30-75	<20	NP-3
	12-36	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-40	11-20
	36-45	Fine sandy loam, sandy loam, loamy sand.	SM, ML, CL-ML, SM-SC	A-4, A-2	0	85-100	78-100	65-100	30-75	<27	NP-7
	45-72	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-42	11-20
24, 25, 26------- Sacul	0-7	Fine sandy loam	SM, ML	A-4	0	95-100	90-100	80-100	40-65	<20	NP-3
	7-43	Clay, silty clay	CH, CL	A-7	0	95-100	90-100	85-95	80-90	45-70	20-40
	43-54	Silty clay loam, silt loam, clay loam.	CL, CH, SC	A-6, A-7, A-4	0	95-100	90-100	85-100	40-90	25-55	8-32
	54-80	Clay loam sandy clay loam, sandy loam.	SM-SC, SC, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-95	40-90	20-40	7-20
27--------------- Smithdale	0-11	Fine sandy loam	SM, SM-SC	A-4, A-2	0	100	90-100	60-95	28-49	<20	NP-5
	11-40	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	90-100	80-96	45-75	23-38	7-16
	40-80	Loam, sandy loam	SM, ML, CL, SC	A-4	0	100	90-100	65-95	36-70	<30	NP-10
28--------------- Smithton	0-13	Fine sandy loam	ML, SM	A-2, A-4	0	95-100	95-100	60-95	30-65	<20	NP-4
	13-45	Fine sandy loam, loam.	ML, CL-ML	A-4	0	95-100	95-100	85-95	55-80	15-25	2-7
	45-72	Fine sandy loam, loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	95-100	95-100	90-100	60-90	20-30	5-15
29, 30----------- Warnock	0-16	Fine sandy loam	SM, SC, SM-SC	A-4, A-2	0	95-100	90-100	50-90	30-45	<25	NP-10
	16-58	Loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	95-100	90-100	70-99	45-75	20-40	7-20
	58-72	Loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	95-100	90-100	60-99	36-75	15-40	5-20
31--------------- Wrightsville	0-17	Silty clay loam	CL	A-6	0	100	100	95-100	90-100	30-40	11-20
	17-56	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	41-65	22-40
	56-80	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	95-100	95-100	90-100	35-55	16-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm	In/hr	In/in	pH				Pct
1*:										
Adaton----------	0-5	10-16	1.50-1.55	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43	5	1-3
	5-72	20-42	1.40-1.45	0.06-0.2	0.18-0.22	4.5-5.5	Moderate-----	0.32		
Felker----------	0-7	15-27	1.30-1.55	0.6-2.0	0.13-0.20	4.5-6.0	Low----------	0.37	5	.5-1
	7-74	18-30	1.40-1.70	0.2-0.6	0.15-0.22	4.5-6.0	Moderate-----	0.37		
2---------------	0-8	15-25	1.40-1.60	0.6-2.0	0.13-0.24	3.6-5.5	Low----------	0.43	5	.5-2
Amy	8-58	20-32	1.35-1.50	0.06-0.2	0.16-0.24	3.6-5.5	Low----------	0.43		
	58-72	15-35	1.35-1.60	0.6-2.0	0.11-0.15	3.6-5.5	Low----------	0.43		
3, 4------------	0-13	4-14	1.35-1.65	0.6-6.0	0.10-0.15	4.5-6.5	Low----------	0.32	5	.5-2
Angie	13-72	35-50	1.25-1.50	0.06-0.2	0.12-0.18	3.6-5.5	High---------	0.32		
5---------------	0-12	2-18	1.35-1.55	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.20	5	.5-2
Bibb	12-72	2-18	1.40-1.60	0.6-2.0	0.12-0.20	4.5-5.5	Low----------	0.37		
6, 7------------	0-9	3-20	1.40-1.60	0.6-2.0	0.11-0.24	4.5-6.5	Low----------	0.37	4	1-2
Blevins	9-50	18-30	1.35-1.60	0.6-2.0	0.15-0.24	4.5-5.5	Low----------	0.37		
	50-65	10-25	1.35-1.60	0.6-2.0	0.13-0.24	4.5-5.5	Low----------	0.37		
	65-72	10-35	1.35-1.60	0.6-2.0	0.13-0.24	4.5-5.5	Low----------	0.37		
8, 9------------	0-10	5-15	1.40-1.60	2.0-6.0	0.10-0.15	5.1-6.5	Low----------	0.32	5	.5-1
Bowie	10-30	18-35	1.60-1.75	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.32		
	30-72	18-35	1.70-1.80	0.2-0.6	0.15-0.20	4.5-5.5	Low----------	0.28		
10, 11----------	0-22	5-18	1.50-1.65	6.0-20	0.07-0.11	4.5-6.5	Low----------	0.20	5	.5-1
Briley	22-72	15-35	1.55-1.69	0.6-2.0	0.13-0.17	4.5-6.0	Low----------	0.24		
12*:										
Darden----------	0-6	2-10	1.40-1.60	6.0-20	0.05-0.09	4.5-7.3	Low----------	0.15	5	.5-1
	6-82	2-10	1.20-1.60	6.0-20	0.05-0.09	4.5-7.3	Low----------	0.15		
Darco-----------	0-42	3-15	1.50-1.65	6.0-20	0.07-0.11	4.5-6.5	Low----------	0.17	5	.5-1
	42-63	20-35	1.55-1.75	0.6-2.0	0.12-0.17	4.5-6.5	Low----------	0.24		
	63-80	12-35	1.55-1.75	0.6-2.0	0.11-0.16	4.5-6.5	Low----------	0.24		
13--------------	0-7	8-27	1.30-1.55	0.6-2.0	0.13-0.20	4.5-6.0	Low----------	0.37	5	.5-1
Felker	7-74	15-35	1.40-1.70	0.2-0.6	0.15-0.22	4.5-6.0	Moderate-----	0.37		
14, 15----------	0-5	5-15	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.49	5	.5-2
Gore	5-45	40-60	1.30-1.75	<0.06	0.14-0.18	4.5-7.3	High---------	0.32		
	45-72	40-80	1.30-1.75	<0.06	0.14-0.18	4.5-8.4	High---------	0.32		
16--------------	0-14	7-25	1.35-1.65	0.6-2.0	0.20-0.23	3.6-6.0	Low----------	0.43	5	.5-2
Guyton	14-55	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low----------	0.37		
	55-72	20-35	1.35-1.70	0.06-2.0	0.15-0.22	3.6-8.4	Low----------	0.37		
17, 18----------	0-9	2-8	1.25-1.35	0.6-6.0	0.08-0.16	3.6-5.5	Low----------	0.20	5	2-4
Harleston	9-34	8-20	1.55-1.65	0.6-2.0	0.13-0.16	3.6-5.5	Low----------	0.32		
	34-72	8-27	1.55-1.65	0.6-2.0	0.13-0.16	3.6-5.5	Low----------	0.32		
19--------------	0-5	27-40	1.40-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Moderate-----	0.32	4	1-4
Louin	5-70	40-70	1.30-1.50	<0.06	0.14-0.18	4.5-5.5	Very high----	0.28		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm	In/hr	In/in	pH				Pct
20---------------- Muskogee	0-4	10-27	1.25-1.50	0.6-2.0	0.16-0.24	3.6-6.0	Low-----------	0.43	5	2-4
	4-28	15-40	1.25-1.45	0.2-0.6	0.16-0.24	3.6-6.0	Moderate-----	0.37		
	28-78	40-65	1.20-1.45	0.06-0.2	0.14-0.18	4.5-7.8	High---------	0.32		
21*. Oil-waste land										
22---------------- Ora	0-11	10-18	1.45-1.55	2.0-6.0	0.10-0.13	3.6-5.5	Low-----------	0.28	3	1-3
	11-19	18-33	1.45-1.60	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.37		
	19-55	18-33	1.70-1.80	0.2-0.6	0.05-0.10	3.6-5.5	Low-----------	0.32		
	55-72	10-35	1.65-1.75	0.6-2.0	0.10-0.15	3.6-5.5	Low-----------	0.37		
23---------------- Ruston	0-12	5-20	1.30-1.50	0.6-2.0	0.09-0.16	4.5-6.5	Low-----------	0.28	5	.5-2
	12-36	18-35	1.40-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28		
	36-45	10-20	1.30-1.70	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.32		
	45-72	15-38	1.40-1.70	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28		
24, 25, 26------- Sacul	0-7	5-25	1.30-1.50	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.32	5	1-3
	7-43	35-60	1.20-1.35	0.06-0.2	0.12-0.18	4.5-5.5	High---------	0.32		
	43-54	20-40	1.25-1.45	0.2-0.6	0.16-0.20	4.5-5.5	Moderate-----	0.37		
	54-80	15-40	1.25-1.50	0.2-0.6	0.12-0.20	4.5-5.5	Moderate-----	0.32		
27---------------- Smithdale	0-11	2-15	1.40-1.50	2.0-6.0	0.14-0.16	4.5-5.5	Low-----------	0.28	5	.5-2
	11-40	18-33	1.40-1.55	0.6-2.0	0.15-0.17	4.5-5.5	Low-----------	0.24		
	40-80	12-27	1.40-1.55	2.0-6.0	0.14-0.16	4.5-5.5	Low-----------	0.28		
28---------------- Smithton	0-13	5-18	1.30-1.50	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.32	5	1-3
	13-45	12-18	1.30-1.50	0.2-0.6	0.11-0.20	4.5-5.5	Low-----------	0.32		
	45-72	15-25	1.25-1.45	0.2-0.6	0.11-0.24	4.5-5.5	Low-----------	0.32		
29, 30----------- Warnock	0-16	2-18	1.30-1.50	2.0-6.0	0.08-0.12	3.6-5.5	Low-----------	0.28	5	.5-2
	16-58	15-35	1.40-1.55	0.6-2.0	0.12-0.17	3.6-5.5	Low-----------	0.24		
	58-72	12-40	1.40-1.55	0.6-2.0	0.10-0.17	3.6-5.5	Low-----------	0.24		
31---------------- Wrightsville	0-17	28-40	1.25-1.45	0.06-0.2	0.18-0.22	3.6-5.5	Low-----------	0.43	5	.5-3
	17-56	35-55	1.20-1.45	<0.06	0.14-0.22	3.6-6.0	High---------	0.37		
	56-80	30-55	1.20-1.50	<0.06	0.14-0.22	3.6-8.4	High---------	0.43		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
1*:									
Adaton	D	None	---	---	0-0.5	Apparent	Jan-Apr	High	High.
Felker	B	None	---	---	2.0-3.0	Apparent	Jan-Apr	High	High.
2 Amy	D	None	---	---	0-1.0	Perched	Jan-Apr	High	Moderate.
3, 4 Angie	D	None	---	---	3.0-5.0	Apparent	Jan-Apr	High	Moderate.
5 Bibb	C	Frequent	Brief	Dec-May	0.5-1.5	Apparent	Dec-Apr	High	Moderate.
6, 7 Blevins	B	None	---	---	>6.0	---	---	Moderate	Moderate.
8, 9 Bowie	B	None	---	---	>6.0	---	---	Moderate	High.
10, 11 Briley	B	None	---	---	>6.0	---	---	Moderate	High.
12*:									
Darden	A	None	---	---	>6.0	---	---	Low	High.
Darco	A	None	---	---	>6.0	---	---	Low	Moderate.
13 Felker	B	None	---	---	2.0-3.0	Apparent	Jan-Apr	High	High.
14, 15 Gore	D	None	---	---	>6.0	---	---	High	Low.
16 Guyton	D	Frequent	Brief to long.	Jan-Dec	0-1.5	Perched	Nov-May	High	Moderate.
17, 18 Harleston	C	None	---	---	2.0-3.0	Apparent	Jan-Apr	Moderate	High.
19 Louin	D	None	---	---	0-2.0	Apparent	Jan-Apr	High	High.
20 Muskogee	C	None	---	---	1.0-2.0	Perched	Jan-Apr	High	Moderate.
21*. Oil-waste land									
22 Ora	C	None	---	---	2.0-3.5	Perched	Jan-Apr	Moderate	High.
23 Ruston	B	None	---	---	>6.0	---	---	Moderate	Moderate.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
24, 25, 26-------- Sacul	C	None--------	---	---	2.0-4.0	Apparent	Jan-Apr	High-----	Moderate.
27---------------- Smithdale	B	None--------	---	---	>6.0	---	---	Low------	Moderate.
28---------------- Smithton	D	None--------	---	---	0-1.0	Perched	Jan-Apr	High-----	High.
29, 30------------ Warnock	B	None--------	---	---	4.0-6.0	Perched	Jan-Mar	Moderate	High.
31---------------- Wrightsville	D	None--------	---	---	0.6-1.5	Perched	Jan-Apr	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16--PHYSICAL ANALYSES OF SELECTED SOILS

[All of the soils except the Harleston very fine sandy loam are the typical pedon for the series. See the section "Soil Series and Their Morphology" for the location of the pedon]

Soil name and sample number	Depth	Horizon	Particle-size distribution					
			Very coarse sand through medium sand (2.0-0.25 mm.)	Fine sand (0.25-0.10 mm.)	Very fine sand (0.10-0.05 mm.)	Total sand (2.0-0.05 mm.)	Silt (0.05-0.002 mm.)	Clay (<0.002mm.)
	Inches		Percent less than 2.0 mm.					
Felker silt loam: S75AR-014-3-(1-6)	0 - 7	Ap	1	4	23	28	64	8
	7 - 20	Bt1	0	3	21	24	57	19
	20 - 36	Bt2	0	2	20	22	58	20
	36 - 50	Bt3	0	2	23	25	59	16
	50 - 63	Bt4	0	2	20	22	47	31
	63 - 74	Bt5	0	1	22	23	44	33
Harleston very fine loam: S81AR-027-1-(1-5)	0 - 5	A	6	20	30	56	39	5
	5 - 9	E	5	21	32	58	37	5
	9 - 16	Bt1	5	21	31	57	30	13
	16 - 34	Bt2	5	21	29	55	30	15
	34 - 60	Btg	4	19	27	50	30	20
Harleston very fine sandy loam*: S81AR-027-2-(1-5)	0 - 6	A	4	23	24	51	45	4
	6 - 10	E	3	20	24	47	45	8
	10 - 20	Bt1	2	15	18	35	45	20
	20 - 37	Bt2	2	15	17	34	47	19
	37 - 60	Btg	2	17	19	38	44	18
Louin silty clay loam: S80AR-027-15(1-7)	0 - 5	A	4	3	5	12	49	39
	5 - 16	AC1	0	1	4	5	43	52
	16 - 30	AC2	0	1	4	5	37	58
	30 - 41	AC3	1	1	3	4	38	58
	41 - 56	AC4	0	1	3	4	34	62
	56 - 69	AC5	0	1	3	4	29	67
Muskogee silt loam: S76AR-014-1-(1-8)	0 - 4	A	3	5	12	20	68	12
	4 - 10	BE	4	4	12	20	63	17
	10 - 18	Bt1	2	4	10	16	60	24
	18 - 28	Bt2	2	5	10	17	51	32
	28 - 43	Bt3	1	3	8	12	42	46
	43 - 55	Bt4	1	3	8	12	44	44
	55 - 65	Bt5	1	2	7	10	43	47
	65 - 78	Bt5	0	3	5	8	31	61
Warnock fine sandy loam: S81AR-027-1-(1-8)	0 - 7	Ap	26	36	10	72	26	2
	7 - 16	E	21	35	10	66	31	3
	16 - 28	Bt1	17	27	9	53	24	23
	28 - 34	Bt2	18	28	8	54	20	26
	34 - 42	Bt3	18	28	8	54	23	23
	42 - 50	Btx	16	29	7	52	20	28
	50 - 58	Btgx**	14	35	6	55	17	28
	58 - 72	Btgx**	17	31	7	55	19	26
Wrightsville silty clay loam: S75AR-014-1-(1-8)	0 - 4	A	0	2	7	9	57	34
	4 - 17	Eg	0	2	10	12	60	28
	17 - 24	B/E	0	1	8	9	50	41
	24 - 37	Btg1	0	1	8	9	48	43
	37 - 46	Btg2	0	1	7	8	47	45
	46 - 56	Btg3	0	1	8	9	49	42
	56 - 70	Btg4	0	1	6	7	44	49
	70 - 80	BC	0	1	5	6	43	51

* Located in the SE1/4SE1/4NW1/4 sec. 26, T. 18 S., R. 21 W. The weighted average clay content in the control section is 19.2 percent. This is 1.2 percent more than allowed by the series, but is considered to be within the range of normal laboratory error.

** The Btgx horizon was subdivided for sampling purposes.

TABLE 17--CHEMICAL ANALYSES OF SELECTED SOILS

[All of the soils except the Harleston very fine sandy loam are the typical pedon for the series. See the section "Soil Series and Their Morphology" for the location of the pedon]

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable acidity	Base saturation	Reaction (1:1 soil :water)	Organic matter
	Inches		--Millequivalents per 100 grams of soil--					Percent	pH	Percent
Felker silt loam. S75AR-014-3-(1-6)	0 - 7	Ap	3.4	0.3	0.1	0.1	7.6	34	4.8	2.2
	7 - 20	Bt1	2.3	1.5	0.1	0.1	8.7	32	4.9	0.5
	20 - 36	Bt2	1.4	1.5	0.1	0.2	10.7	23	5.2	0.2
	36 - 50	Bt3	0.6	1.2	0.2	0.4	8.7	18	5.2	0.1
	50 - 63	Bt4	1.2	3.5	0.8	0.3	17.9	24	5.2	0.1
	63 - 74	Bt5	1.5	5.3	1.3	0.3	20.1	29	5.2	0.1
Harleston very fine loam: S81AR-027-1-(1-5)	0 - 5	A	3.1	0.8	0.8	0.3	11.0	31	4.5	3.6
	5 - 9	E	0.4	3.9	0.4	0.1	5.9	45	4.4	1.1
	9 - 16	Bt1	2.3	0.8	0.8	0.1	6.2	45	4.8	0.6
	16 - 34	Bt2	2.8	1.2	0.8	0.2	8.2	38	4.6	0.4
	34 - 60	Btg	3.0	0.2	0.7	0.2	11.2	27	4.7	0.4
Harleston very fine sandy loam*: S81AR-027-2-(1-5)	0 - 6	A	4.3	1.6	0.5	0.4	7.3	48	5.3	1.7
	6 - 10	E	3.5	0.3	0.7	0.1	6.2	43	4.7	1.1
	10 - 20	Bt1	5.4	3.3	0.7	0.2	9.3	51	5.0	0.5
	20 - 37	Bt2	3.8	3.2	0.8	0.2	9.2	47	4.6	0.3
	37 - 60	Btg	0.2	2.7	0.8	0.2	9.3	30	4.7	0.2
Louin silty clay loam: S80AR-027-15(1-7)	0 - 5	A	4.0	8.0	0.7	0.4	24.0	35	4.5	5.0
	5 - 16	AC1	12.2	6.6	0.6	0.7	19.1	51	4.8	2.6
	16 - 30	AC2	13.5	0.9	0.9	0.6	24.1	40	4.7	1.5
	30 - 41	AC3	16.9	14.5	0.5	0.8	18.6	64	4.5	0.6
	41 - 56	AC4	19.7	20.4	1.5	1.0	16.0	73	4.5	1.0
	56 - 69	AC5	19.1	23.1	2.5	0.8	17.2	73	4.5	0.4
Muskogee silt loam: S76AR-014-1-(1-8)	0 - 4	A	0.6	0.9	0.0	0.1	15.8	9	4.7	3.1
	4 - 10	BE	0.7	1.9	0.0	0.1	13.8	16	4.3	1.2
	10 - 18	Bt1	1.5	2.3	0.1	0.2	15.4	21	3.7	0.5
	18 - 28	Bt2	2.0	3.4	0.2	0.2	18.1	24	3.8	0.3
	28 - 43	Bt3	5.9	8.8	0.8	0.4	22.5	41	4.6	0.3
	43 - 55	Bt4	8.7	10.4	1.4	0.4	15.8	57	4.8	0.2
	55 - 65	Bt5	12.2	14.4	2.5	0.4	11.9	71	4.9	0.2
	65 - 78	Bt6	16.1	19.2	4.0	0.5	6.3	86	5.5	0.2
Warnock fine sandy loam: S81AR-027-1-(1-8)	0 - 7	Ap	0.7	0.2	0.0	0.0	5.7	14	4.6	1.5
	7 - 16	E	0.5	0.1	0.0	0.0	2.9	17	4.6	0.3
	16 - 28	Bt1	0.6	3.5	0.0	0.2	11.9	27	4.2	0.4
	28 - 34	Bt2	0.1	4.4	0.0	0.3	13.4	26	4.0	0.2
	34 - 42	Bt3	0.1	3.8	0.0	0.2	15.4	21	4.1	0.2
	42 - 50	Btx	0.1	3.2	0.0	0.2	13.1	21	4.1	0.2
	50 - 58	Btgx**	0.1	2.9	0.0	0.2	13.4	19	4.0	0.1
	58 - 72	Btgx**	0.1	2.3	0.1	0.2	15.7	15	4.6	0.2
Wrightsville silty clay loam: S75AR-014-1-(1-8)	0 - 4	A	6.2	2.6	0.1	0.2	16.1	36	4.4	2.8
	4 - 17	Eg	4.3	2.5	0.2	0.2	10.7	40	4.6	0.7
	17 - 24	B/E	8.3	4.6	0.3	0.3	15.5	47	4.7	0.6
	24 - 37	Btg1	9.4	5.0	0.5	0.3	18.0	46	4.5	0.6
	37 - 46	Btg2	12.4	7.1	0.9	0.4	15.8	57	4.5	0.4
	46 - 56	Btg3	12.7	8.2	1.4	0.4	13.0	64	4.6	0.2
	56 - 70	Btg4	16.8	12.4	2.3	0.5	11.7	73	4.7	0.1
	70 - 80	BC	20.1	13.7	2.5	0.5	7.2	84	6.3	0.1

* Located in the SE1/4SE1/4NW1/4 sec. 26, T. 18 S., R. 21 W.
** The Btgx horizon was subdivided for sampling purposes.

TABLE 18--ENGINEERING INDEX TEST DATA

[Tests performed by the Arkansas State Highway and Transportation Department. All of the pedons are the typical pedon for the series. For the location of the pedons, see the section "Soil Series and Their Morphology]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution Percentage passing seive--				Liquid limit	Plasticity index	Moisture density	
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200			Maximum dry density	Optimum moisture
							Pct			
Warnock fine sandy loam: (S82AR-027-1)										
Bt1----------------16 to 28	A-4(2)	SC	100	99	94	49	30	10	115.8	14.1
Btx----------------42 to 58	A-4(2)	SC	100	100	95	47	31	10	112.6	15.0
Wrightsville silty clay loam: (S75AR-014-1)										
Eg------------------4 to 17	A-6(14)	CL	100	100	100	96	31	15	106.5	17.3
B/E----------------17 to 24	A-7-6(31)	CL	100	100	100	97	48	30	103.1	21.4
Btg1---------------24 to 37	A-7-6(36)	CH	100	100	100	96	52	35	101.1	21.9

TABLE 19.--CLASSIFICATION OF THE SOILS

[An asterisk indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Adaton	Fine-silty, mixed, thermic Typic Ochraqualfs
Amy	Fine-silty, siliceous, thermic Typic Ochraquults
Angie	Clayey, mixed, thermic Aquic Paleudults
Bibb	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Blevins	Fine-silty, siliceous, thermic Typic Paleudults
Bowie	Fine-loamy, siliceous, thermic Plinthic Paleudults
Briley	Loamy, siliceous, thermic Arenic Paleudults
Darco	Loamy, siliceous, thermic Grossarenic Paleudults
Darden	Thermic, coated Typic Quartzipsamments
Felker	Fine-silty, siliceous, thermic Aquic Paleudults
Gore	Fine, mixed, thermic Vertic Paleudalfs
Guyton	Fine-silty, siliceous, thermic Typic Glossaqualfs
Harleston	Coarse-loamy, siliceous, thermic Aquic Paleudults
Louin	Fine, montmorillonitic, thermic Aquentic Chromuderts
*Muskogee	Fine-silty, mixed, thermic Aquic Paleudalfs
Ora	Fine-loamy, siliceous, thermic Typic Fragiudults
Ruston	Fine-loamy, siliceous, thermic Typic Paleudults
Sacul	Clayey, mixed, thermic Aquic Hapludults
Smithdale	Fine-loamy, siliceous, thermic Typic Hapludults
Smithton	Coarse-loamy, siliceous, thermic Typic Paleaquults
Warnock	Fine-loamy, siliceous, thermic Typic Paleudults
Wrightsville	Fine, mixed, thermic Typic Glossaqualfs

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